RAILROAD GAZETTE

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Contributions

Highway Crossing Bells.

Baltimore, Md., July 16, 1900.

TO THE EDITOR OF THE RAILROAD GAZETTE.

Have noted with much interest the articles in late issues of your valuable paper, concerning crossing bells, and having had considerable experience with highway bells, I can not pass by the opportunity of advocating a more general use of the audible warning apparatus at highway crossings, and trust that other states will soon follow Rhode Island in the matter of protection at dangerous crossings.

The assertion seems strange that a reliable bell is lacking; I am positive that there can be found on the market at least two or three quite reliable bells, which will answer every purpose. Too much must not be expected of an apparatus of this kind, without attention. In most cases the apparatus is installed and left until the battery or motive power is exhausted, or it has met with some mishap which has caused it to stop ringing, or to ring indefinitely. While the apparatus is necessarily delicate it is not much more so than the telegraph or telephone instruments used in our offices and which require periodical attention; just so should the crossing bell be inspected regularly. Most of the unreliable crossing bells referred to, are put up as experiments by employees of the railroads.

My observation leads me to believe that bells do warn people to be cautious at a crossing, and do not lure them on the track; even though the bell be silent its presence warns people, and makes them look before attempting to cross. The records will show that very rarely has there been an accident where a bell was erected. It is much more economical for the railroad people to put up audible signals of a standard make, at country and village crossings where the travel is light, than to pay judgments obtained against them for not protecting crossings.

B.

Some Observations on the Tonnage Rating of Engines.*

Lack of Uniformity.—One of the most striking things about tonnage rating is the lack of uniformity in the methods used by the different roads. On most lines the principle is applied to revenue earning freight trains. On some roads passenger trains, work trains, helpers and switching trains are included, while on still others only through freight trains are built on the tonnage plan. As the performance of engines handling work trains can be ascertained with reasonable accuracy, there seems to be no good reason for rating them on other than a tonnage basis. It is becoming apparent that for passenger engines the ton-mile is a much more accurate and constant basis on which to figure the cost of fuel, supplies, wages, repairs, etc., than the engine mile.

The consensus of opinion is against the application of tonnage rating to switch engines. This apparent unanimity, however, has not deterred those from putting into practical operation what they consider a correct principle. As switch engines have always been credited with an arbitrary number of miles each day in order to have something against which to charge cost of wages, supplies, etc., it is claimed that an arbitrary ton-mileage can be made more nearly to approximate the actual performance than an arbitrary engine mileage. No satisfactory method of doing this has yet been presented.

In building trains it is the practice of most roads to include the weights of all cars behind the tender. Some roads include the tender and caboose. Other roads include the weight of the engine itself, while still others take no account of either engine, or caboose. Mr. Quereau, of the Denver & Rio Grande, very ably advocates including the weight of the entire train in tonnage statistics, as in no other way, in his opinion, can a just comparison be made between lines with heavy grades and those with light grades. He cites the fact that on roads over mountains where the grades are heavy, the engine and caboose will average from 20 to 25 per cent. of the weight of the entire train, while on roads having light grades the weight of the engine and caboose will average only 9 or 10 per cent. of the total weight of the train. While it may be desirable from a motive power standpoint to include the weight of the engine in tonnage statistics in order to give that department a credit against which to charge expenses for engines running light, it is thought unnecessary and undesirable from a transportation standpoint, as what we desire to know is: What weight behind the tender is the engine capable of moving? As Mr. Cole, of the Lehigh Valley, so concisely states, an engine as such does not exist unless it can haul something more than its own weight, and its rating, therefore, is not its ability to move itself around, but must of necessity be the tonnage that it can haul outside of its own weight, and its only value lies in the tonnage that it can haul exclusive of its own weight. This is a sidelight of one of the phases of this many-sided question. Experience may demonstrate the necessity of keeping this information at some future time as a part of our statistics.

There is a marked difference of opinion among many roads as to what constitutes a train-mile. Until a common understanding is had there can be no comparisons between lines whose definition of the term is not the same. On some lines train-mileage and engine-mileage are synonymous. Some roads count light engines, engines and cabooses, and helper engines as trains. Other roads count a part of these and exclude the other part, while still others do not include them at all. On most lines train-mileage and engine-mileage are considered as two separate and distinct things. This is without question the correct way to consider them. Both items should be kept.

Until a more uniform system is adopted, the plan now in use by Mr. Cavanagh, of the Big Four, will more nearly meet the requirements of those desiring to make comparisons. On his statistical report he separates the engine-mileage into train-mileage, light engine-mileage, engines with cabooses, double-head and helper engine-mileage, so that the official of any line desiring to compare his figures with those of the Big Four has only to add the different items together and compare with his method of getting the same result.

There is a wide difference of opinion as to what constitutes the correct basis on which to estimate engine performance. Some roads use as a basis the total tons moved one mile; some the tons handled over the prevailing grade; some the tons hauled into and out of terminals; while a few roads use all three of these. Still other roads use as a basis the tons handled in the direction of prevailing traffic. No basis should be considered of much importance which does not have as its foundation the total tons moved one mile in each direction. The basis of compiling statistics on the direction of prevailing traffic is not applicable to all lines as, on a number of roads, particularly in the East, it is frequently the case that twice as heavy a train of loaded cars can be hauled in the direction of prevailing traffic as empty cars can be hauled in the opposite direction. In other words, it is often necessary to move power light in the direction of the prevailing traffic to take empty cars back. The tons handled into terminals and out of terminals as a basis of compiling statistics has but little merit, and should not be used for this purpose, as statistics compiled from this source cannot be accurate. Some roads use this information, i. e., tons into and out of terminals as a check by the division officers on the train load.

There is a lack of uniformity in many details. The unit of load may be taken as an instance. Most roads use the ton or 2,000 lbs. as the unit of load, but some roads use 100 lbs., and others use 1,000 lbs. as the unit. Up to July 1, 1899, the B. & O. and the B. & O. S. W. roads used 6½ tons as the unit of load, but this was discontinued for the sake of uniformity. Inasmuch as the weights of cars delivered by one road to another are accepted by the receiving line it is essential that a common unit of load be decided upon in order to facilitate the interchange of business and minimize errors.

There is a great disparity among roads in the building of trains, particularly in the weights of cars. Some roads use actual weights of empty cars, while others use arbitrary weights independent of the stenciled weights on cars. Some roads make no allowance between trains composed of loaded cars and those composed of empty cars. Some roads when handling trains composed of both loaded and empty cars allow in addition to its stenciled or arbitrary weight an additional weight for each empty car. Allowances for weight of freight in merchandise cars vary from one to six tons. The Railway Transportation Association decided that four tons was more nearly the correct figure.

Can Comparisons Be Made Between Roads?—Were this question, at this time, left for decision to the operating officials they would decide almost unanimously in the negative. The reasons for this are quite evident. No two roads apply the tonnage system in exactly the same way. This in itself would make a comparison of little value even if all other conditions were the same. Before making comparisons we must take into consideration the motive power and equipment of the roads to be compared; the kind of coal used, whether anthracite or bituminous; the grades of freights handled, whether cotton, furniture and other commodities of similar light weights, or pig iron, ores, coal and lumber; the quality of water used, whether the minimum amount of coal will evaporate a gallon and whether the engine can run the maximum length of time without washing out, or the opposite; the grades to be overcome; the speed to be maintained. If the class of freight requires fast time the rating of the engine must necessarily be reduced, whereas if the freight can be handled on a slow schedule the engine performance will be materially increased. Some localities are much more subject than others to constant and heavy winds; some to dew, fogs and frosts by reason of proximity to large bodies of water; others to snow and long continued cold; still others have sandy soil or soil that easily pulverizes and permeates the journals and bearings, thus requiring additional energy to overcome added friction. All of these conditions must be considered and due allowance made before we can compare the operation of railroads in such localities with those in more favored regions. In comparing the results of operation we will naturally desire to compare the cost of operation, but in attempting this we are confronted in the very beginning with the discovery that all roads are not agreed as to what data should be considered. * * *

As Mr. Crombie, of the Pere Marquette, says, railroad managers and financiers have always made comparisons between different railroads and will continue to make comparisons, and they will not ask our permission to do so. They will, however, ask us to explain differences and to give reasons for unfavorable showings. It, therefore, behooves us to install a system where now confusion reigns, and to adopt a uniform practice in the treatment of all the different phases of this question. * * *

Real Object of Tonnage Rating.—It has been the history of all reform movements that the pendulum of progress has swung from one extreme to the other. It is so with this. Most roads, in loading their engines, give them as many tons as they can drag over the road. The question is being asked whether this is a wise practice, or whether it would not be better to load the engine with the view of making an economical trip. We all know that, when an engine is loaded to its fullest capacity, delays are frequent, opposing trains are laid out, and, unless conditions are most favorable, trains stall on grades, necessitating doubling. This practice is hard on machinery, is the means of consuming more fuel and supplies and results frequently in overtime.

The officials of the Pere Marquette Railroad have made greater progress along the lines of economical operation in engine rating than those of any other line. Mr. Crombie, of that road, to whom great credit must be given for his investigations along these lines, in a recent meeting of the Railway Transportation Association, spoke as follows: "An intelligent application of tonnage ratings can only be had when comparisons can be made in dollars and cents. The great value of the calculation of tonnage performance in dollars and cents, rather than in per cent. of maximum efficiency, is the conclusive proof furnished of the economy of the operation. It was found by tonnage ratings that such trains might become so loaded that the operation would be extravagant instead of economical. When we found that the ratings became burdensome by causing overtime and burning an excessive amount of coal, then the rating was changed and the lower figure was termed 100 per cent., so, in that way, we do not consider we are hauling 80 per cent.; we have changed the rating to the economical point. As the point to be watched is the dollars and cents cost of the movement of the tonnage, it is immaterial to the operating man whether the engine hauls 80 per cent. of her maximum capacity or 120 per cent. of her stated rating. We prepare a daily statement for each division of each tonnage train, and we show in that statement the individual engine, the individual engineer, the tonnage they move out of terminals, over prevailing grades and for the entire trip, the cost in wages and the cost in coal. Now, it is just possible that by running your engine to 100 per cent. you make her consume an extravagant amount of coal and may run up your overtime. On the other hand, you may find that by running her with what is termed 80 per cent. of her tonnage she is making an economical trip."

The Ideal Method of Engine Rating.—Mr. G. P. Conard, of the Railway Equipment Register; Mr. T. O. Cole, of the Lehigh Valley, and Mr. E. M. Collins, of the M., K. & T., working independently of each other, have evolved a plan for the rating of engines which, judged by our experience, is more satisfactory than any other method which has been suggested. Mr. Conard worked his scheme out on theoretical lines, while Messrs. Cole and Collins put their ideas into practice. Mr. Conard

*Extracts from a paper by Mr. C. C. Riley, Superintendent of Car Service, Baltimore & Ohio Southwestern, prepared for the July meeting of the Central Association of Railroad Officers.

takes as his starting point the rating of the engine on a level piece of track, under the most favorable conditions, while Messrs. Cole and Collins take as their starting point the rating of the engine over the prevailing grade. The former plan appeals to us as being the more nearly ideal.

The B. & O. S. W., like most other roads, uses the "flexible" method of rating; that is, the rating changes as often as the conditions vary. For example: An engine hauling common dead freight is rated at 1,400 tons; the same engine performing a certain kind of quick dispatch service is rated at 1,200 tons, and the same engine hauling another class of quick dispatch freight is rated at 1,000 tons. If the weather is bad, the rating is reduced on all three classes of trains. By this method we, of course, have a general idea of the performance of our engines and cause of loss of engine efficiency, but we do not know what per cent. of each engine's total capacity is during the week or month or other period for which the record is kept because of this flexible rating. For the same reason we do not have other than a general idea of the items that enter into this loss of energy.

Mr. Conard's idea is to take the ideal condition for economical operation, which is a well-built roadbed, without grades or curves; well-kept equipment of maximum capacity, both as to motive power and rolling stock; sufficient tonnage moving in either direction to maintain a regular service, which should be uninterrupted by unfavorable weather conditions, and let this theoretical condition constitute the initial point from which to figure out results under actual conditions. He would, therefore, establish the rating of engines on a level piece of track under the most favorable conditions, and such rating would not be varied whatever service the engine may be in. The different items entering into the loss of engine efficiency would be tabulated, so that at the end of the period for which record was kept there would be shown, in graphic form, all of the factors that entered into the loss of locomotive energy. Under Mr. Conard's plan, on the reports rendered there would be shown what would have been accomplished under ideal conditions, and what was really accomplished. The loss of engine efficiency would be shown under the proper headings, such as:

First—Roadway conditions, such as grades and curves and track.

Second—Motive power and rolling stock conditions, such as defective machinery or poor equipment.

Third—Weather conditions.

Fourth—Traffic conditions, such as fast service, nothing to move, running light, etc.

Fifth—Miscellaneous conditions, such as maximum train length, bad water, bad fuel, errors of employees, etc.

A report made out in this graphic form would show to each official interested in the operation of the road the essential reasons why perfect results are unattainable on each division. Some objection might be raised because the comparisons between the several divisions would not be equitable on account of the varying conditions, but, as Mr. Conard states, the division which approximates the ideal should not be given more credit for utilizing 90 per cent. of its engine efficiency than another division which has many difficulties to surmount and is unable to utilize more than 50 per cent. of engine efficiency. As he well states, it is reasonable to suppose that, under such a plan as we describe above, there would naturally be fostered a desire to improve or eliminate, as far as possible, all adverse conditions. This, in his opinion, would result in a continual study as to whether these adverse conditions may be overcome in order to obtain constantly improved comparative results. The rating would then not vary, and different divisions could be intelligently compared each with the other. Any marked variations from the best percentage attainable on each division would have to be accounted for, and such explanation would show exactly what was the cause of the abnormal results.

This plan should be supplemented with a greater exchange of information. Each superintendent should be given all the information obtainable which affects the operation of his division. Most roads have a series of reports, but they do not go far enough. On the B. & O. S. W. the Chief Dispatcher makes daily a report showing the number of the train, number of engine, the tons handled in and out of terminals, the loads and empties handled in and out of terminals. This report is all right for the purpose for which it is intended; namely, to check the train load. The car service officer, or the officer compiling tonnage statistics, should in turn send to the division officer a daily or weekly statement, as may be decided upon, showing the performance of each engine, engineman, fireman and conductor, or such other information as may be decided upon as necessary, and show, under proper heading, the engine efficiency lost. This will enable an accurate record of the performance to be kept, not only of machinery, but of men, and any weakness in either is quickly made manifest.

Both Mr. Cole and Mr. Collins have in practical operation the scheme outlined above, except that, as before stated, they took the prevailing grade as the initial point of engine rating. The results obtained by each have been about the same. There are, however, a few differences of detail, the most important of which is the source of information from which loss of engine efficiency is figured. Mr. Cole secures this information from the division superintendent, while Mr. Collins has it shown on the conductors' train report. In order to insure uniform results, the M. K. & T. are considering the advisability of making reductions in rating on account of adverse conditions in accordance with a table prepared for that purpose.

A New Transmission Dynamometer.*

BY W. ELWELL GOLDSBOROUGH.

The dynamometer described in this paper is the outcome of a series of attempts to devise an instrument for the measurement of mechanical power comparable with electrical instruments as regards simplicity of design, ease of calibration, permanency of adjustment and the accuracy of the readings obtained. The dynamometer cannot be said to embody any radically new ideas. The principles upon which its success depends have been used in several other instruments; there is presented here simply a new adaptation of these principles. The instrument has been jointly developed by my assistant, Mr. E. T. Mug and myself.

The dynamometer, as shown in Figs. 1 and 2, is designed especially for testing electric motors of from five to twenty-five horse power capacity, and can only be used by directly connecting it between the driving element, the motor to be tested and the driven element, a dynamo, adjusted to absorb the power developed. It consists of a shaft, shown in Fig. 3, which is made in two parts. These are kept in line by having a portion of the left hand section turned down to exactly fit a concentric hole bored in the right hand section of the shaft. The joint presents a sufficient bearing surface to enable the instrument to stand quite severe lateral strains, although it is not sufficient to admit of the dynamometer being used to transmit power through the medium of belt-driven and driving pulleys attached to the outer ends of the shaft. For the dynamometer to be available for this class of work, the two sections of the shaft should be made in the form of quills to fit a second shaft extending completely through both sections.

Each section of the shaft is provided with a spiral grip-thread, turned to fit a spiral spring of ¾-in. pitch. These threads are shown in the lower half of Fig. 3. The sections are also fitted with jaw collars, shown in the upper half of Fig. 3, that are turned to the same pitch. They have their spiral jaw surfaces cut to overhang the shaft, and make an angle of 45° with the shaft surface. The jaw collars, when forced into position by the lock nuts, with the aid of a spanner wrench, hold the end turns of the springs very securely, preventing them not only from slipping around the grip-thread, but also from springing out when the direction of rotation is such as to tend to unwind the spring.

All the spirals used with the dynamometer must have a pitch of ¾ in., and be wound to snugly fit a shaft 2 19/32 inches in diameter. The jaw will securely hold springs from .2 inch to .6 inch in diameter, but necessarily the larger springs give a more stable adjustment and add stiffness to the instrument, considered as a transmitting device. Within the capacities of the springs, therefore, comparing them relatively to one another, the conditions for accurate work are more favorable with the larger springs. All the experimental work referred to here, however, was carried out with a spring made of standard No. 5 steel wire, which is slightly over .2 inch in diameter.

On the free sections of the shaft, shown between the hexagonal section and the oil grooves, are mounted two instantaneous contact wheels, insulated from the shaft by hard fiber bushings. Each of these wheels, which are shown in Figs. 1 and 2, carries at its rim a contact edge made of sheet brass and set parallel to the shaft in a hard fiber plug, driven into an inverted V groove, and turned down flush with the surface of the wheel. The contact points are grounded on the shaft, and are, therefore, in electrical connection with one another, although insulated from the contact wheels. Two brush holders mounted on the dynamometer bearings, and carrying 90° graduated scales, supply the brush supports and complete the contact devices; they provide for the possibility of obtaining readings when the angular deflection of one wheel rim contact point is 180° from the other. The brushes are carried on insulated brush rods, and are connected with one another through several primary cells and a telephone receiver, all in series. This adjustment supplies the means of detecting when the brushes are so placed that the contact points on the wheels pass under them at the same instant, since at such times a "click" is heard in the telephone at each revolution of the dynamometer shaft.

The description thus far given indicates with sufficient clearness the method of using the dynamometer and of obtaining instantaneous readings of the torque exerted by the driving element at any time. When, in the case illustrated, the motor is started up, the angular deflection between the contact points is increased above its initial value until the resistance to flexure offered by the spring overcomes the frictional resistance of the generator, and motion is imparted to its armature. If, by speeding up the motor or loading down the generator, conditions are varied so as to increase the resistance to motion between the two machines, there will be a still further deflection of the spring until the balance is restored between the forces acting. The variation in the angular deflection is quickly and easily followed by shifting the contact brushes until the "click" occurs in the telephone. In case the "click" is not sufficiently pronounced, a condenser, shown in Fig. 2, is connected in parallel with the telephone receiver, and its capacity adjusted until the "click" is sharp and clear cut. If ordinary conditions of constant load are maintained, such as are usual in any laboratory test, the "click" in the receiver will be kept up at a constant frequency, and the relative motion between the contact points will be zero, as shown by repeated trials, even when the smallest spring is used; and when a suitable tachometer is at hand, ideal conditions are presented for making instantaneous determinations of the power transmitted.

In testing a given motor, the best results have been obtained by using a spring which will give a deflection of 180° when the motor is fully loaded. The brush setting admits of an accuracy within .2 of one degree, and thus the determination of the full load torque can be obtained within one-tenth of 1 per cent. This compares favorably with the results obtained with the usual laboratory electrical instruments.

The method used in calibrating the dynamometer is illustrated in Fig. 2. It is rapidly and easily effected with the aid of the two long wrenches shown in the cut. These are adjusted on the hexagonal sections of the shaft, one being used as a scale arm and the other as a lever. For any given point the lever is drawn over till the scale arm shows a tendency to raise from its horizontal position; the brushes are then placed on the contact points and adjusted till a clear "click" is obtained in the receiver on making and breaking the battery circuit; and a record is made of the scale arm moment and the deflection scale reading. The calibration curve of the dynamometer fitted with the lightest spring is shown in Fig. 4, and repeated tests before and after use fail to show any change in its calibration constants.

As an evidence of the ease with which accurate results can be obtained, I give here the results of a test made upon a three-phase induction motor conjointly with Mr. Mug, and two seniors in electrical engineering at Purdue University, Messrs. A. F. Chamberlain and C. R. Dooley, to determine the characteristics of the motor. The results may be the more interesting in view of the fact that the test embodied a very simple method for obtaining the mechanical torque developed by the motor at any speed.

The electrical readings were obtained by connecting an ammeter and the current coil of a wattmeter in each circuit, and a voltmeter and the voltage coil of a wattmeter between each terminal of the motor and the neutral point of the three star connected transformers feeding the motor. The voltage was kept constant at 53.7 volts between the motor terminals. The speed was determined by belting a calibrated magneto-generator to the motor shaft and reading the voltage developed at its brush terminals; and the torque from the dynamometer. Every factor entering into the test could, therefore, be obtained simultaneously and very accurately.

The motor was started up from rest and held at a low speed by the generator. The generator was connected with its two shunt field coils in parallel, instead of in series, across its brushes. With this connection it acted as a short-circuited series direct-current dynamo. To add stability to the adjustment, the series coil of the dynamo was separately excited with a small current. The speed of the motor increased till the counter torque developed by the generator equaled the torque of the induction motor. The speed then assumed a perfectly constant value, and readings were obtained from all the instruments. Next, a resistance was connected in the armature circuit in series with the shunt winding; the induction motor increased its speed until the counter torque of the generator again equaled the torque of the motor; the speed again became perfectly constant, and readings were taken. The speed stability of this arrangement is owing to the fact that the torque of the direct current machine increased very nearly as the square of its armature speed, and, therefore, very much faster than the torque of the induction motor. Using this adjustment, the speed and torque of an induction motor can be held at all common values at will.

I hope I may be pardoned for dwelling upon these experimental details, but I do not now recall having ever seen a description in print of a simple and successful method of obtaining the torque of an induction motor for speeds below the speed of maximum torque.

The curves of Figs. 5, 6 and 7 show the experimental values of all the characteristics of the motor below as well as above the point of maximum power, and bring out the relations that hold between the several factors at the very low speeds. The curve designated "electrical" torque represents the torque that the machine would develop with the given input if it had an efficiency of 100 per cent. at all loads.

The curves are chiefly valuable in showing the accuracy with which torque readings can be obtained. The curve of "Horse Power Output" of Fig. 5 depends directly upon the product of the instantaneous speed and dynamometer readings, and is very accurately defined by the plotted points. In tests upon motors of larger capacity the dynamometer is even more satisfactory from the experimenter's standpoint; not because its accuracy is necessarily greater, but because of the more rigid coupling between the machines. There is nothing about the dynamometer to get out of order, the bearing friction is very small and practically eliminated in the calibrating; the springs are cheap and easily adjusted.

A spring can be taken out and another substituted for it in about five minutes, and the dynamometer can be calibrated in five minutes; but best of all, perhaps, it can be put in the hands of inexperienced experimenters, after having once been adjusted, and be used by them with success, as there is nothing to get out of order.

When the load on the dynamometer is subject to rapid

*A paper read at the seventeenth general meeting of the American Institute of Electrical Engineers, Philadelphia, May 16, 1900.

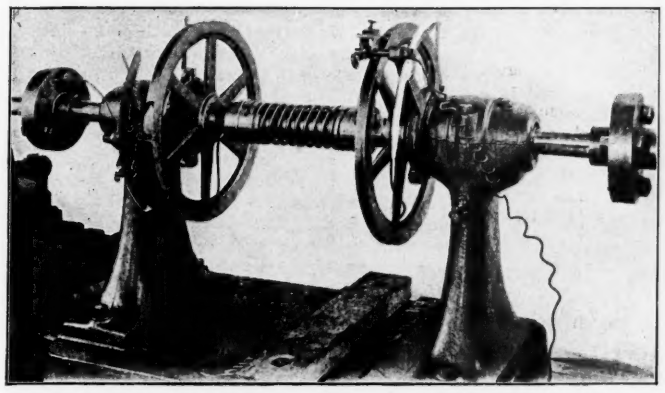


Fig. 1.

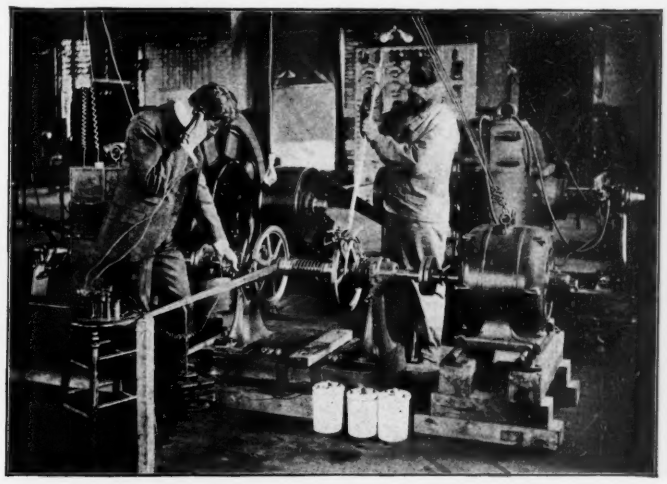


Fig. 2.

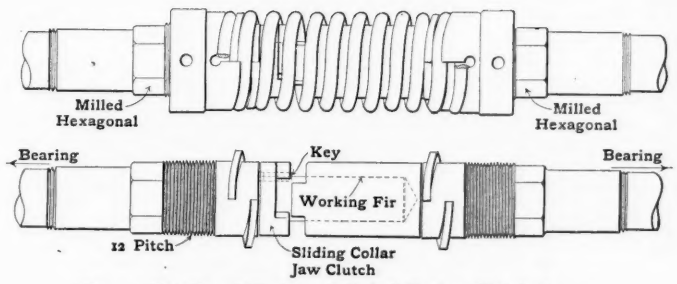


Fig. 3.—Details of Shaft and Spiral Spring Clutch Jaws.

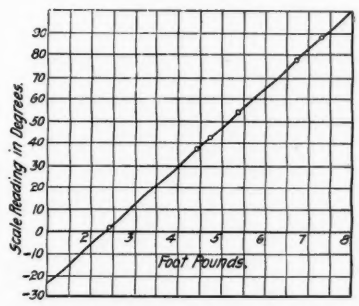


Fig. 4.—Calibration Curve of Dynamometer Spring.

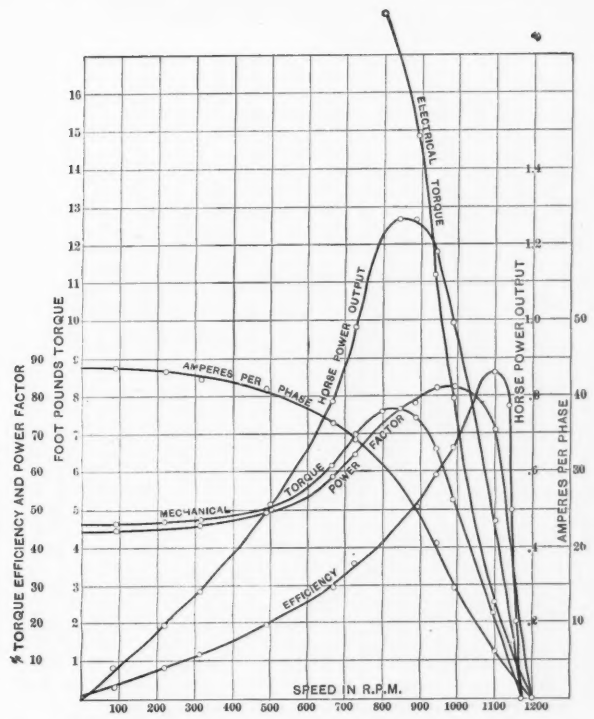


Fig. 5.—Speed Characteristics of Three-Phase Induction Motor.

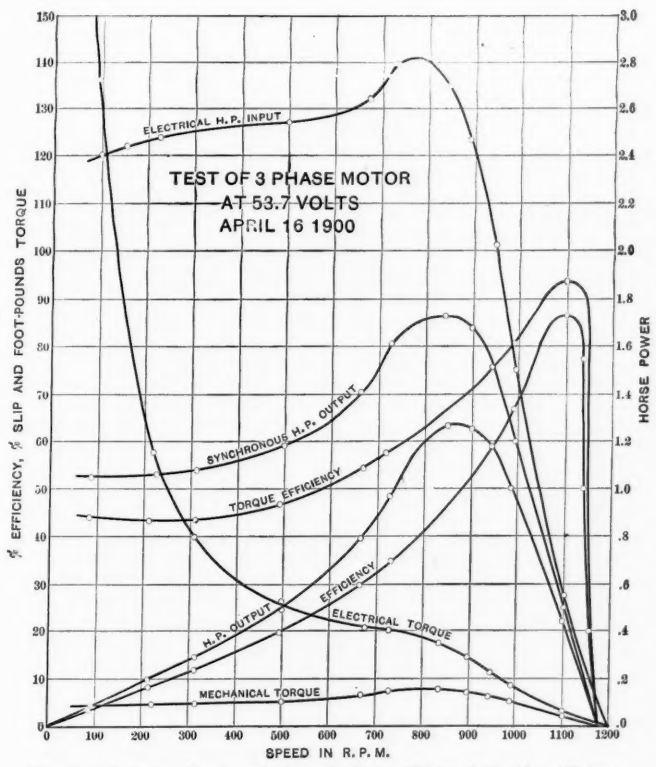


Fig. 6.—Torque Characteristics of Three-Phase Induction Motor.

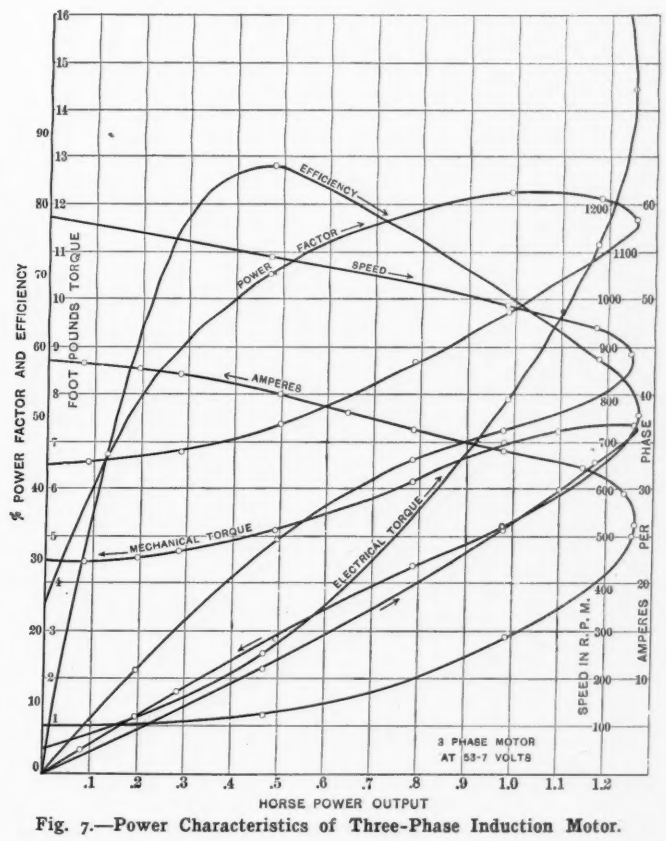


Fig. 7.—Power Characteristics of Three-Phase Induction Motor.

Engravings With the Description of a New Transmission Dynamometer.

variations, the clutch, shown at the center of the shaft in Fig. 3, should be moved over to the right. It will then lock with the jaw on the right hand section of the shaft in case the deflection exceeds 90° and prevent the possibility of the spring being overstrained.

The Pennsylvania's Class E-2 Experimental Locomotive.

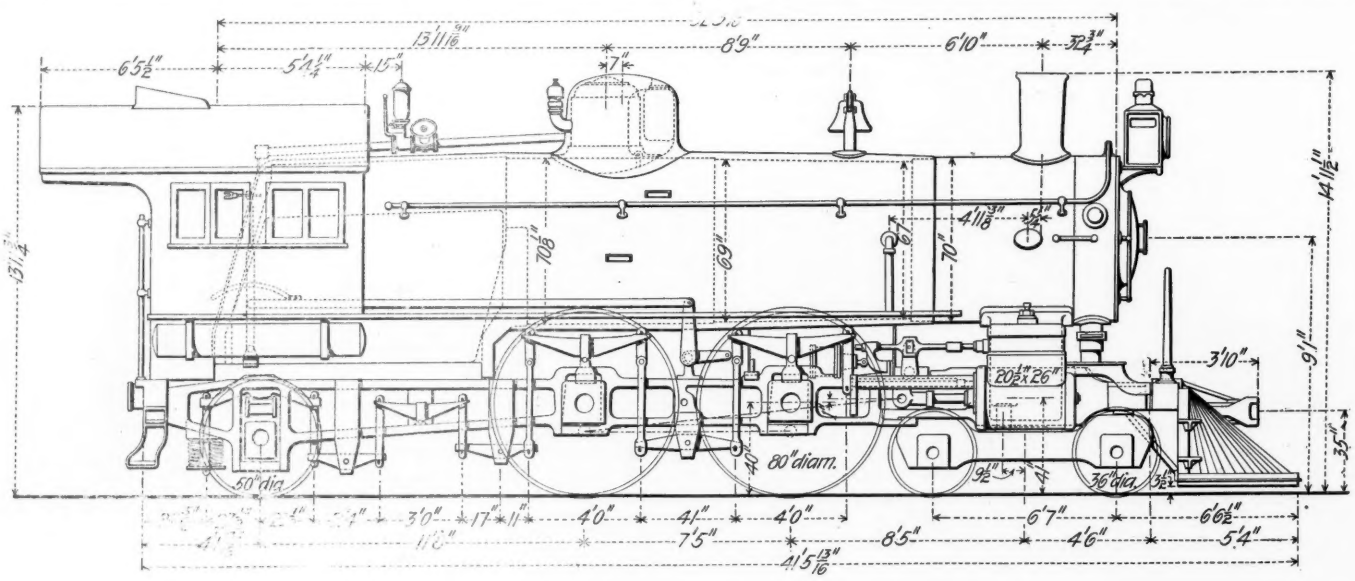
There is being built, at the Altoona shops of the Pennsylvania Railroad Company, an Atlantic type locomotive which will be designated Class E-2, and will be a modification of Class E-1. The first engine of Class E-1 was turned out of the Juniata shops in July, 1899, and an illustrated description of engine No. 698 appeared in the *Railroad Gazette*, July 7, 1899, p. 487. With this article appears an outline drawing of the engine which is being built as Class E-2, of which, for the time being at least, there will be but one. The engines of Class E-have given satisfactory service in the work for which they were designed, and the motives in designing modifications of this class are, first, to produce a locomotive suitable for general heavy express service, which shall be somewhat more powerful than the Class D-16-c, and burn either anthracite or bituminous coal; second to that is the desire to adhere to the standard practice of the Pennsylvania road of keeping the engineer and fireman together, rather than separating them, as in the case of the Class E-1 engine, where the cab was placed far forward upon the boiler as is the common arrangement where the Wootten fire-box is used.

It is at once apparent, in comparing the present illustration with engravings of the Class E-1, that in this latest design the forward part of the locomotive, say to include the No. 1 driving wheel, is fairly a duplicate of the Class E-1. The wheel base and distances from center to center of journals, back to and including the No. 2 driving wheels, are identical. From this point back material differences are apparent. The cab is located at the back end of the boiler immediately over the trailing wheels. The back head of the boiler is sharply sloped. The outline of the fire-box shows very material changes. The effort to dispense with the Wootten fire-box and still maintain a large grate area is apparent throughout, and rules the design of this part of the engine. The wheel base from center of No. 2 driving wheel journal to center of trailing wheel journal is 11 ft. 8 in. in this engine, as against 7 ft. 5 in. in the Class E-1. To have made an addition of 4 ft. 3 in. to the rigid wheel base would not have been practicable. The trailing wheels are, therefore, made radial to accommodate this extra length of wheel base. Reference to the frame pedestal of the trailing wheel journal shows the general arrangement of this mounting.

The cylinders are 20½ x 26 in., as in the case of Class E-1. The driving wheels, likewise, are 80 in. in diam. The trailing wheels in the Class E-2 will be 50 in. in diam., while those in Class E-1 are 56 in. in diam. The total length of Class E-1 from point of pilot to back face of cab deck is 38 ft. 1 in. Measurement on the same lines for Class E-2 is 41 ft. 5 13-16 in. The tender will be the same as that for the Class E-1 engines.

The grate area will be 51 sq. ft., as against 69 sq. ft. in the Class E-1; the total heating surface will be 2,430 sq. ft. as compared with 2,320.4 sq. ft. in the class E-1; the tractive power, on the basis of 80 per cent. mean effective pressure from a boiler pressure of 185 lbs. per sq. in., will be slightly over 20,000 lbs. as in the case of Class E-1.

The general appearance of this engine will be radically different from that of the one with which it is compared and to whose class it practically belongs. The change of location of the cab and the increase of wheel base between the No. 2 driver and the trailing wheel make such transformation in general contour that the engines will scarcely be identified at a glance as being of similar class construction. From the outline drawing which is here published it will be seen that symmetry is not lost and that this modified design will readily take place among the many creditable specimens of modern locomotive building.



Class E-2.—Modified Atlantic Type Locomotive for the Pennsylvania Railroad.

Highway Crossing Alarms.

BY J. S. EVANS.*

A few years ago automatic crossing alarms were practically an unknown quantity because the few that were then in use gave such poor service that their general use could not be recommended. But as railroading has advanced, so have crossing alarms, with the result that there are now quite a number on the market, giving excellent satisfaction. The matter of protecting highway crossings by means of automatic alarms commands attention for the following reasons:

1. The number of accidents that are constantly occurring, and the accompanying loss of life, and the expense incident thereto.

2. To forestall unjust legislation against railroads by local city and town authorities.

3. The increased speed and number of trains, which demand a clear right of way.

It is evident that more and better protection is necessary at all highway crossings in thickly-settled districts, and many dangerous crossings in sparsely settled districts, which can not be furnished, except at prohibitory expense, unless it can be done by some automatic device.

The protection of highway crossings with a gate and gateman means, approximately:

An initial investment of	$300.00
Maintenance expense (labor, interest, repair, fuel, etc.,) per annum	400.00
	$700.00
Cost of protection first year	$700.00
Cost of protection per annum thereafter	400.00

To guard a crossing with an automatic alarm means, approximately—

An initial investment of	$200.00
Maintenance expense per year	50.00
	$250.00
Cost of protection first year	$250.00
Cost of protection per annum thereafter	50.00

These figures show a net saving of at least $350.00 a year in favor of the automatic alarm, not taking into consideration that the alarm is on duty at all times.

The questions arise: Are automatic alarms an adequate protection? What is the proper principle upon which they should be constructed? What may be expected of them? The signal engineers of all the larger roads have long ago condemned any electric signals that the elements or train movements may injure or put out of order without notice thereof being given immediately. Hence, the closed track-circuit has been universally adopted because of its simplicity, reliability, and self-operating tell-tale qualities if properly constructed.

Nearly all track-circuit crossing bells operate on practically the same principle, and if properly installed and maintained will announce the approach of every train. Such a signal should be designed to meet the following requirements: The alarm at the crossing should be given when the first pair of trucks reach a point sufficiently distant from the crossing to give at least twenty seconds' warning for the fastest approaching train. It should not cease until the last pair of approaching trucks have crossed the highway. If the alarm is silenced when the first pair of trucks have passed the highway, a second approaching train would give no warning, and such a condition, where double tracks are used, would increase the danger instead of eliminating it. My road has a crossing protected where there are four tracks, all of them used for single track movements, and it happens very frequently that a second and even a third train approaches the crossing at high speed before the first has entirely passed the highway. If the bell would stop ringing when the first pair of trucks reached the highway, any one waiting to pass over would proceed when the first train had passed, perhaps just in time to be met and injured by the second train on one of the other tracks. The alarm not being silenced, however, until the last wheel approaching from any direction has reached and passed the highway, the warning continues and danger of accident is averted. It often happens that a train of considerable length is followed by a light engine only a few hundred feet distant from the rear end of the train. This is especially the case where trains are coming into the yard limits. In such a case, it is very evident that if the first pair of trucks silenced the bell, there would be no warning of the approach of the second train. Again, it is not a rare occurrence that a train breaks in two while running, and the forward section of the train gets a considerable distance ahead of the remaining portion. In this case, if the bell were silenced by the first pair of trucks, the rear end of the train approaching the crossing would be as much a menace to human life as the light engine or second train. Incidents of this kind are not lacking to demonstrate the value of the above feature.

An alarm should be constructed on the closed circuit principle, so that if the batteries have become exhausted, either from actual work or by accident, an indication thereof will be given. The breaking of relays, wires or other mechanism forming a part of a highway alarm should also be automatically indicated.

The bell should be sufficiently loud and of a decided, plain stroke, so that its meaning cannot be misunderstood.

The batteries should be placed in receptacles in which they will not freeze, and in which they can not be tampered with (preferably iron boxes), or non-freezible batteries should be used, and the mechanism of the alarm should be as simple as possible, with only as many moving parts and contacts as are absolutely necessary, so that the ordinary lineman or telegraph operator who is familiar with simple electrical devices will have no trouble in understanding it and will be able to install and maintain it.

Lastly, under no circumstances should the bell ring after the train has gone by the crossing, or ring when actual danger at the crossing does not exist. If there are sidings or passing tracks at the crossing, the alarm should be given for all tracks, but should be so arranged that a train taking the passing siding and stopping before it reaches the crossing, will not operate the bell continuously, but as soon as the train starts forward again (at which time danger will exist at the crossing) the bell should ring just the same as if it were a through train on any of the other tracks. While the bell is inoperative for a train so standing on a passing siding, the bell must give warning for all approaching trains on the other tracks; and should this train back away from the crossing instead of proceeding, no alarm must be given for this movement. In other words, any crossing alarm should be so arranged and designed that there can be no mistaking what it means when the gong is sounding, that is, for every wheel that approaches the crossing, which is a menace to human life, it must cause that alarm to be given; under no circumstances must it give a false alarm. In all track-circuits, whenever they are short-circuited, no matter whether the wheel is going away from, or approaching the crossing, the alarm will be sounded. Ample provision should be made to guard against the sounding of the alarm as the wheel goes away from the crossing, and any alarm which cannot be so arranged as to cover this point is, in my estimation, not a proper one to ask the public to depend upon, and would not furnish adequate defense to a railroad company so using it in case of accident.

*Superintendent of Telegraph, New York, Chicago & St. Louis Ry. Read before the Association of Railway Telegraph Superintendents, at Detroit, June 21.

The Crops.

The following notes are from the latest issue of *Bradstreet's*: About an average wheat crop may be looked for as a whole. Spring wheat has been cut short, the damage in the Northwest resulting in the probability of only about one-half an average spring wheat crop, but a gain in the Southwestern winter-wheat belt will probably allow of a total wheat crop slightly in excess of 510,000,000 bushels, and, therefore, equal to the average for ten years past. If late advices from the Northwest are correct, however, this total will be exceeded, and a yield of 540,000,000 bushels seems fairly well assured. Corn promises exceedingly well, an immense acreage, the largest, in fact, ever planted, having gone into this crop

and condition on July 1 favoring a yield next to the largest ever gathered. The oats crop will be good, one of the heaviest ever grown, and the same is true of winter rye. Fruit crops promise well, apples and peaches particularly so. The cotton situation is unfavorable, the condition on July 1 for the cotton region as a whole being the lowest indicated at that date that there is any record of. Wheat is 8 per cent., corn 20 per cent. and cotton 66 per cent. higher in price than on July 1 a year ago.

Low Cost Power for Electric Lighting, Pumping, Machine Shops, etc.

BY CHARLES HANSEL, M. AM. SOC. C. E.

The supreme importance of low cost power in all industries is now universally conceded and the close student of power follows with interest the rapid advancement in this basic field of industry. A comparison of the thermo-dynamic value of various sources of power with the latest achievements in steam engineering indicates that we shall never get the highest obtainable efficiency by means of the steam engine.

Mr. George Westinghouse says: "Long familiarity with the electrical industry; the pipe line transportation of natural gas in great quantities; and an active interest in the development of large gas engines, satisfy me that the economies which will result from the distribution of power by means of gas generated at central points, and conveyed in pipes along the lines of railroad for the operation of engines and electric generators, will be sufficient to justify the expenditure of the capital necessary for such installations in connection with the electrical equipment of railroads; particularly metropolitan and suburban lines." While the general public may not, at this time be prepared to give unqualified indorsement to this opinion, the broad experience of Mr. Westinghouse entitles him to believe that it will receive universal consideration and cause us to give more thought to the magnitude of the wasted energy in the consumption of coal for producing steam.

The New York *Tribune*, of May 3, says: "The Navy Department has been called upon to supply technical

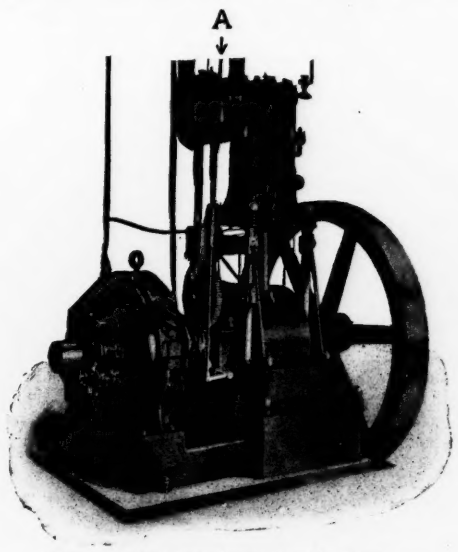


Fig. 1.—Self-Contained Electric Plant.

information for an interesting and important set of experiments now being conducted by one of the largest manufacturing corporations in the country. The purpose is to demonstrate the feasibility and advantage of propelling a ship by power derived from gas engines, supplied by gas generated on the vessel itself." The highest type of marine engine presents a barbarous method of using the heat units of coal. We can not expect to secure much more than 6 per cent. of the value of coal in effective propelling power, and while it may be demonstrated that the substitution of gas for steam power on vessels will give higher efficiency in power and greater capacity for freight and passengers, together with a greater range of action, we have still to face an enormous loss of heat units whether we produce gas from coal or crude petroleum. While the doing away with the steam plant will mark an epoch in engineering, we shall mark a new era in industrial progress and approach more nearly to ideal conditions when we abolish both the steam and the gas plant and employ in an internal combustion engine a unit which carries the highest thermodynamic value. Gas engines are now being adopted for plants of large capacity and the great success already achieved by the gas engine could have been far greater if a more satisfactory fuel had been available.

Naphtha is only slightly cheaper than gas, and is too dangerous for general use. Kerosene oil meets the requirements for a fuel suitable for producing low cost power. It is the most highly concentrated form of fuel known, that is at the same time safe and cheap. It might be described as solar energy condensed in a safe liquid form. As a reservoir of power one gallon of oil is superior to one ton of storage battery.

Coal of 14,600 B. T. U. used in a steam plant of 12½ per cent. efficiency yields about 1,400,000 ft. lbs.

Petroleum oil of 20,700 B. T. U. consumed in an explosive engine of 30 per cent. efficiency would yield 4,794,000 ft. lbs.

A glance at **the oil lamp** explains the difficulties attendant upon the use of this agent for producing power by means of an internal combustion engine. The difficulty of producing perfect combustion limits the range of candle power in the oil lamp, and has for years baffled engineers who have attempted to bring it to the use of man, through the internal combustion engine. While it was, some time since, found practicable to use kerosene in an engine with unvarying load, the train of evils resulting from the difficulty of obtaining perfect combustion under varying loads has until now prevented the general use of kerosene engines. The production of a commercial oil engine suitable for large plants depends upon the solution of inter-related problems in chemistry, thermo-dynamics and mechanics. The common method of attempting the solution of the problem has been to attack it on the mechanical side, leaving the chemical problem of perfect combustion under varying loads and conditions, to solve itself. An oil engine has generally been nothing more than a gas engine, with a pump and atomizer added with unsatisfactory results. Commercial practicability takes into account all the conditions, not only the known conditions but the unknown conditions, and with the knowledge of achievements in the production of an internal combustion engine burning kerosene oil. We can not describe "a new industrial situation" without noting the most modern type of internal combustion oil engine. For just as surely as we mark the increasing superiority of the gas engine over steam just so must we mark the superiority of the oil engine over the gas engine. The oil engine has not only kept pace with the gas engine, but seems to have reached and passed the gas engine in its march against the extravagant power furnished by steam, and we can now do away with the boiler and the gas machine for power plants.

Internal combustion engines of large horse-power units are now in successful operation. Units of 1,500 h. p. are now building. The steam engine is nearly perfect, as an engine, but its possibilities are limited and controlled by the efficiency or inefficiency of its destructive associates, the furnace and the boiler. The principles of the internal combustion engine admit of a range in temperature that would be physically impossible in the steam engine.

The term petroleum is broad enough to cover all the petroleum products, and naphtha and gasoline engines are frequently masked under the broad and protective title of petroleum engines. The danger attendant upon the use of naphtha and gasoline is well known and the restriction placed upon these distillations of petroleum are becoming more rigid as the use of the small naphtha and gasoline motors increase the number of accidents. Kerosene is considered a safe fluid that is used in homes throughout all lands, and forms 80 per cent. of the total production of crude petroleum.

The last report of the Standard Oil Co. shows the production of crude petroleum to be, for the United States:

	Gallons.	Per cent.
Appalachian field	1,380,750,000	57.17
Lima and Indiana field	849,030,000	35.16
All other fields	185,220,000	7.67
	2,415,000,000	100.00

The oil fields of Russia are also producing about the same amount and are easily capable of producing a much larger quantity. Petroleum is also found in quantities in Amiano and other points in Italy; in Burmah, Trinidad, Austria, Germany, Roumania, Canada, Sumatra, Java, China and Japan, and will no doubt be found in regions not yet tested. Sixty per cent. of the production of the United States is exported.

Argument.—If we produce an engine that will use crude petroleum or kerosene oil in complete combustion, with varying load, using cold liquid petroleum, a continuous impulse governor, an automatic feed dispensing with vaporizers, a controlled ignition point, capable of adjustment to avoid shock, facility for starting by having the first explosion occur without compression in the cylinder, a system of governing which diminishes the power of the impulses rather than lessens their frequency, a correctly proportioned and homogeneous mixture of air and oil in the cylinders, a compact design avoiding excess material while at the same time bringing the factor of safety and economical maintenance above that usually offered, we shall have accomplished more than has been done in the best gas engine. The oil engine is not controlled in its field of usefulness by the gas-producing plant, or the area of natural gas.

If, however, we not only accomplish all the requirements of a satisfactory oil engine, but at the same time add to its field of usefulness all the opportunities of the gas engine, providing an internal combustion engine which will operate equally well either with gas or oil, thus securing every advantage of the gas engine without the disadvantage of its limitations, we shall have accomplished a result which will receive the commendation of the industrial world.

A New Industrial Situation.—Some time since my attention was called to the results obtained with the engine made by the General Power Co. I found that this company has completed several types of engines, adapted to use either gas or petroleum, as desired. The marine type has been followed for economy of floor space, greatest rigidity, and freedom from vibration. The cylinder is supported so as to admit of convenient access to working parts.

Fig. 1 illustrates a self-contained electric generating system. The shaft of engine extends through the dynamo and avoids the necessity of the spring connection common to gas engines unless there are two or more cylinders. This engine has for some time been furnishing 150 16 c. p. lights and is as closely governed as the best steam engine, the steadiness of its action being marked by a variation of less than 1 volt. The oil is fed through the small pipe, A, leading from a small oil tank set at any convenient point.

Fig. 2 represents the latest type of engine adapted for producing power either for electrical purposes or general shop work. Improvements have been made in details of design, principally in the governing mechanism, which is supported on the engine bed, instead of on the standards as in Fig. 1. This change admits of greater simplicity in the design and appearance of the engine.

The engine for marine work is also completed and the automobile engine about completed. These engines were not in position to allow me to make any working test, but since the important factor of an oil engine is perfect combustion, and since this has been accomplished in types described in Figs. 1 and 2, we may assume with reasonable assurance that the marine and automobile engines will give satisfactory results. Its thermo-dynamic method is scientific and reliable. The governor supplies a correctly-proportioned mixture of fuel and air measured out to suit the work. Under all variations of load, the consumption is practically chemically complete, which means no visible unconsumed carbon or smoke.

A railroad station equipped with this engine can furnish all station lights, as well as switch and signal lights, and operate a pump for supplying a water tank, for less money than the cost of oil if burned in lamps. Whether the water tank is close to the station or far from it matters not, for convenience, as the motor for working the pump can be controlled from the station and the telltale will indicate condition of supply. As the quantity of water taken from tank is variable it is necessary with steam engines to keep fire and pressure constantly, in order that the tank may be kept full under all conditions of traffic. Consequently, fuel is wasted and an attendant is required at all times.

With a self-contained electric plant in the baggage car, current can be furnished at minimum cost for light-

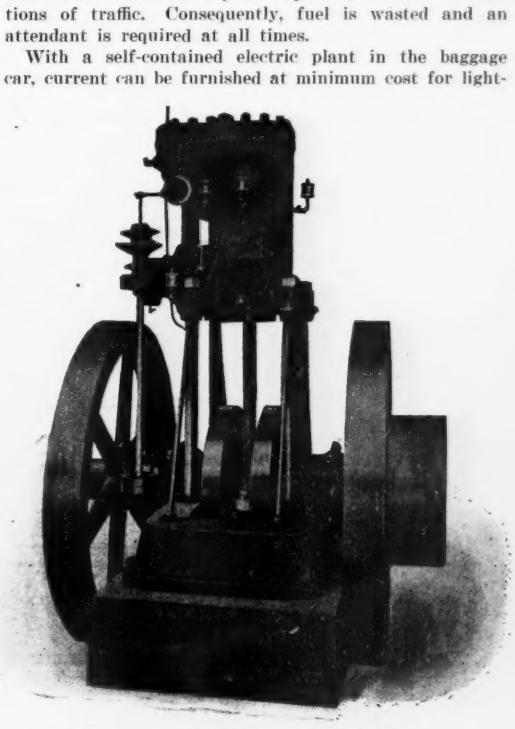


Fig. 2.—25-Horse-Power Oil Engine.

ing and operating fans for ventilation. No service is required of the locomotive, as is the case with a steam plant in baggage car, or the brake drag, as in the case of axle car lighting. The system would be much cheaper than any storage system, or any scheme which requires a generator and storage batteries on each car, taking power from the axle.

The best practice in installing power for machine shops is to avoid the long lines of shafting by using smaller units of power in groups of machines. In plants where the power is in a single unit 25 per cent. to 30 per cent. of the power is consumed in the friction of shafting and belting. This system can be applied to a distribution of power in any units desired, by furnishing each department or group of machines with an engine. As this engine requires no licensed engineer they can be cared for by a helper, and a number of engines can be under one man's supervision. It is not necessary to enumerate the divisions of usefulness of a satisfactory oil burning engine. For wherever power is required there will it be needed.

The Transportation Show at Paris.

We gave, July 6, p. 465, some notes concerning the exhibition of railroad machinery at Paris as taken from the *Journal des Transports*. In a later issue of that journal a short review is made of the locomotive exhibit of the French State Railroads. This system shows four locomotives. One of these is a high-speed engine, Vauclain compound, built by the Baldwins. Another is a simple engine carrying high-boiler pressure, built in the shops of the State Railroads. Another is a French engine for light passenger trains and still another a small narrow gage engine.

The Baldwin engine is one of a series of five similar compound engines built by the Baldwins for heavy ex-

press service for the State Railroads, along with six simple engines (with piston valves) built by the same works and for the same service. The writer in the French journal gives a short description of the Vauclain engine shown at the World's Fair. This, however, we need not repeat, for the weight, dimensions, etc., have been sufficiently well published.

The French writer says that one can properly praise the practical sense shown in the design of this engine, as, for example, in the facility and safety afforded for getting at all parts even out on the road. It is a machine admirably planned and solidly carried out. It cannot be said, however, that it is elegantly carried out. "We do not find the finish, the elegance or perfect adjustment which characterize French construction." To this the Americans reply that "provided that an engine is substantial, that it runs easily, that it can make a certain number of thousand miles without stopping, everything else is useless luxury. A locomotive is not an object of art, but a tool to work with, which ought to be quickly built, easily adjusted, easily kept up, and worn out fast while giving the maximum of effective work. It has no business to stop working until it goes into the scrap heap. Our engines do not live as long perhaps as others, but in the end they will be found to have made just as many kilometers as the longer-lived engines, and, meanwhile, we have the advantage of changing often enough to keep up with improvements in the art."

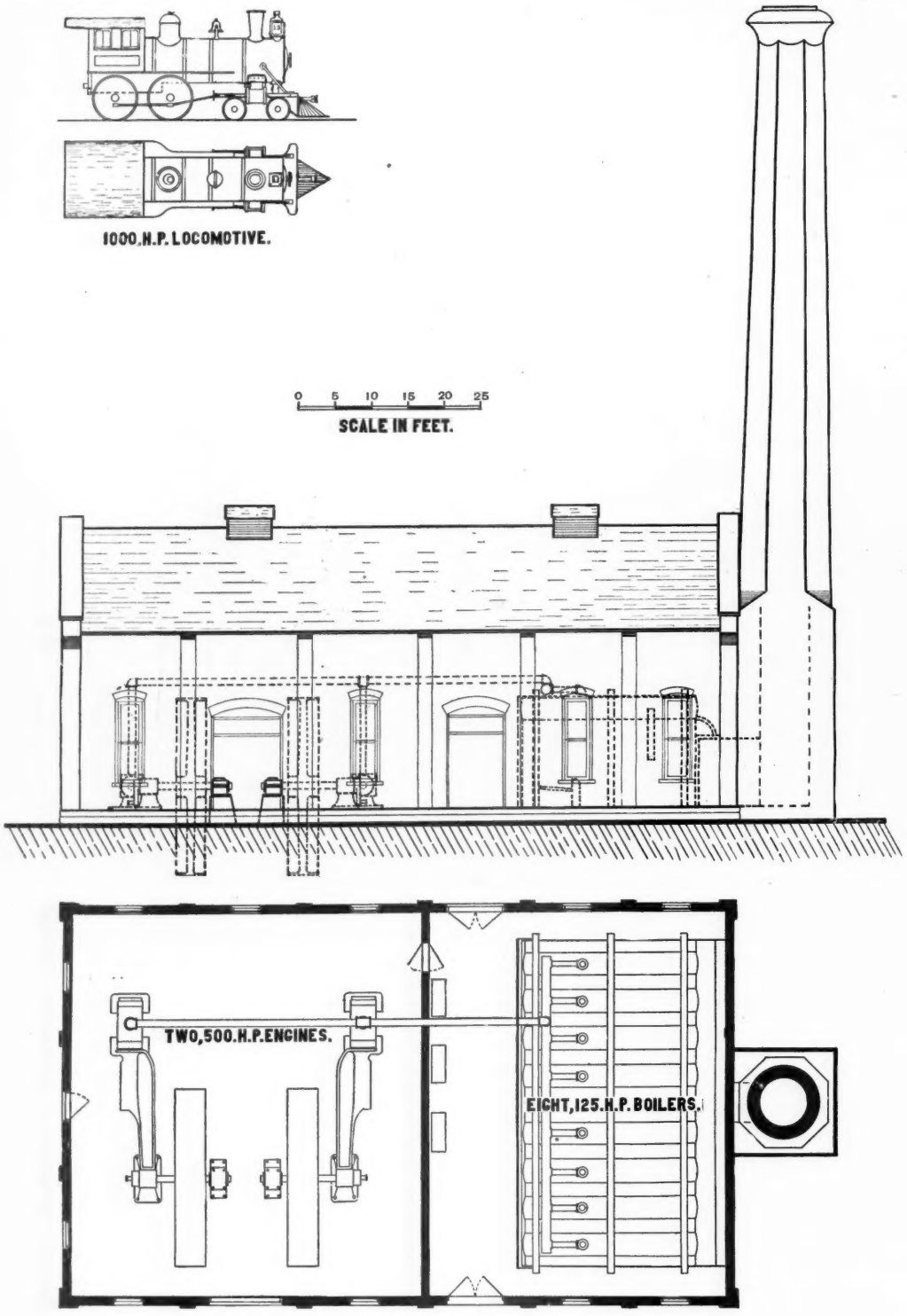
The heavy express engine, built in the shops of the State Railroads, which stands side by side with the American engine, shows at once the great points of difference. Its weight is slightly less and the diameter of the driving wheels is somewhat less. It is of a type brought out in 1896 by M. Ricour. It has four drivers coupled and a bogie truck forward. These engines are intended to haul 220 metric tons at 120 kilometers an hour where the grade is low, and the same train at 70 kilometers an hour on grades of 1 per cent.

The light engine is designed to take 70 metric tons at 75 kilometers an hour. On light down grades it reaches 100 kilometers an hour without difficulty. These engines are very cheaply kept up. No other particulars of them are given in the short account before us. Engines of this class, built in 1882, have run 600,000 kilometers and still have the original valves and valve motion. The wear is not appreciable. The particular attention of the Americans is called to this fact.

Two Power Plants Each of 1,000 Horse-Power Capacity.

The drawings show two power plants each of a thousand horse-power. Both are drawn to the same scale, so that a comparison of the figures discloses their relative dimensions. The smaller of the two drawings represents a modern locomotive consisting of a single boiler and two high-speed engines. Having 2,000 ft. of heating surface and 20 x 24 in. cylinders, it is quite capable of delivering the power assigned it. The plant represented by the larger drawing is not more liberal in its dimensions than such plants have need to be. It is made up of a suitable building containing a battery of boilers and two slow-speed engines. The drawings tell their own story. Those of the stationary plant cover an area of paper which is many times greater than that covered by the drawings of the locomotive, and yet the power capabilities of the two plants are the same.

It is evident that a process which permits the smaller apparatus to equal that of the larger must be one of unusual activity. When one is inclined to criticize the locomotive because it is somewhat less economical in fuel than the stationary plant, or because it sometimes smokes, or occasionally sends out a few sparks, he should first look at these drawings. He will find in them a ready explanation and excuse.



Two Power Plants, Each of 1,000 Horse-Power Capacity.

Coke Burning in France.

BY GEO. L. FOWLER.

In an article on Coke for Locomotive Fuel, published in the *Railroad Gazette* of June 22, allusion was made to the work that is being done in burning coke upon the foreign railroads. As the matter is of great importance, some additional data regarding the work done is here given. For the information touching the methods of the Western Railroad of France I am indebted to M. Edouard Sauvage, of the motive power department of that road.

"The use of gas coke as a steam fuel has been greatly extended in recent years, especially in cities. In a number of cases it is preferred to coal, because it develops no smoke in burning. It is true that it sets free large quantities of carbonic oxide and sulphurous acid, gases that are poisonous, but as they are invisible and not noticeable they are allowed to pass. In Paris the police regulations provide for the exclusive use of coke on the river steamers and the steam tramways."

It must not be thought, however, that it is in universal use upon the railroads, for coal and briquettes are still the principal fuel, in fact the coke is chiefly used by the Eastern and Western Railroads for working those portions of their lines that lie in Paris and its immediate vicinity. Coke is also burned, but in very limited quantity, by tank engines working in certain seaports. For Paris and suburban traffic, in some cases the locomotives burn coke exclusively; in others, they carry both coke and coal, and the firemen are instructed that, in certain places, they are not to fire with coal.

The gas coke works were for a long time hampered by enormous quantities of the by-product, gas coke. But by a careful regulation of the price and a close study of the methods of burning, they have succeeded in fostering the demand until now their whole product is disposed of. At the gas works the coke is graded according to size; the largest being used for steam fuel, the small for domestic heating, and the very fine as one of the ingredients in the manufacture of briquettes. It is this gas coke that is chiefly used on the locomotives though it is apparently of a somewhat better grade than coke obtained from the same source (the gas works) in this country.

The specifications under which the Western Railroad purchases coke require that the coal used in the manufacture of the coke shall be acceptable to the company: this to protect itself against injurious matter in the ash. The coke, when made, shall be sonorous, not friable, and the fracture homogeneous of a steel gray color. At the time of its delivery, it must be freshly made and as free as possible from sulphur, pyrites and foreign matter. The amount of ash, dependent upon the composition of the coal is also specified, and then if, upon delivery, this amount is exceeded a reduction in price is made of 2½ centimes (½ cent) per ton for each .05 of 1 per cent. or fractional part thereof of contained ash, above the specified amount.

As in this country, it has been found that it is not necessary to make any alteration in the grates for burning coke in locomotives.

As for the calorific value of the coke it is estimated that 6 pounds of gas coke is the equivalent of 5 pounds of good briquette. Of course, the composition varies with that of the coal from which it is made, but the following make be taken as a fair average analysis:

Carbon	80.34	per cent.
Water	3.50	" "
Volatile matter	6.50	" "
Ash	9.66	" "
	100.00	per cent.

An analysis of the ash gives:

Silicon	14.00	per cent.
Aluminum	9.81	" "
Lime	.47	" "
Magnesium	5.62	" "
Oxide of iron and manganese	70.10	" "
	100.00	per cent.

From which it would appear that the calorific value of the fuel is less than that deduceable from the analysis of the special American coke given in the issue of June 22, on page 422, but that the absence of sulphur from the ash will make the former less objectionable.

Extensively as coke is used it provides only about 4.2 per cent. of the locomotive fuel used on the Western Railroad of France. The total fuel consumption for 1899 on that road was as follows, the figures being given in metric tons of 2,200 lbs. (1,000 kilograms).

Coke	28,377	tons
Coal (lump)	88,048	"
" (small)	389,106	"
Briquettes	171,705	"
	677,236	tons

Some Railroad Matters in France.

A Frenchman got tickets for himself and family from a station on one line of the Paris, Lyons & Mediterranean Railroad to a station on another line. The train was so delayed by switching freight cars, etc. (presumably it was a mixed train) that the travelers missed the connecting train and had to stay over night at the junction, and arrived at their destination 12 hours late. Hereupon the passenger asked for 500 francs damages. The company offered him 60 francs, as representing the expense incurred on account of the delay, but denied liability for any other damage. The Paris court, before which suit was brought, declared, however, that it was liable and must make time-tables which it can run its trains by; and it awarded 200 francs damages.

There have been very numerous and bitter complaints

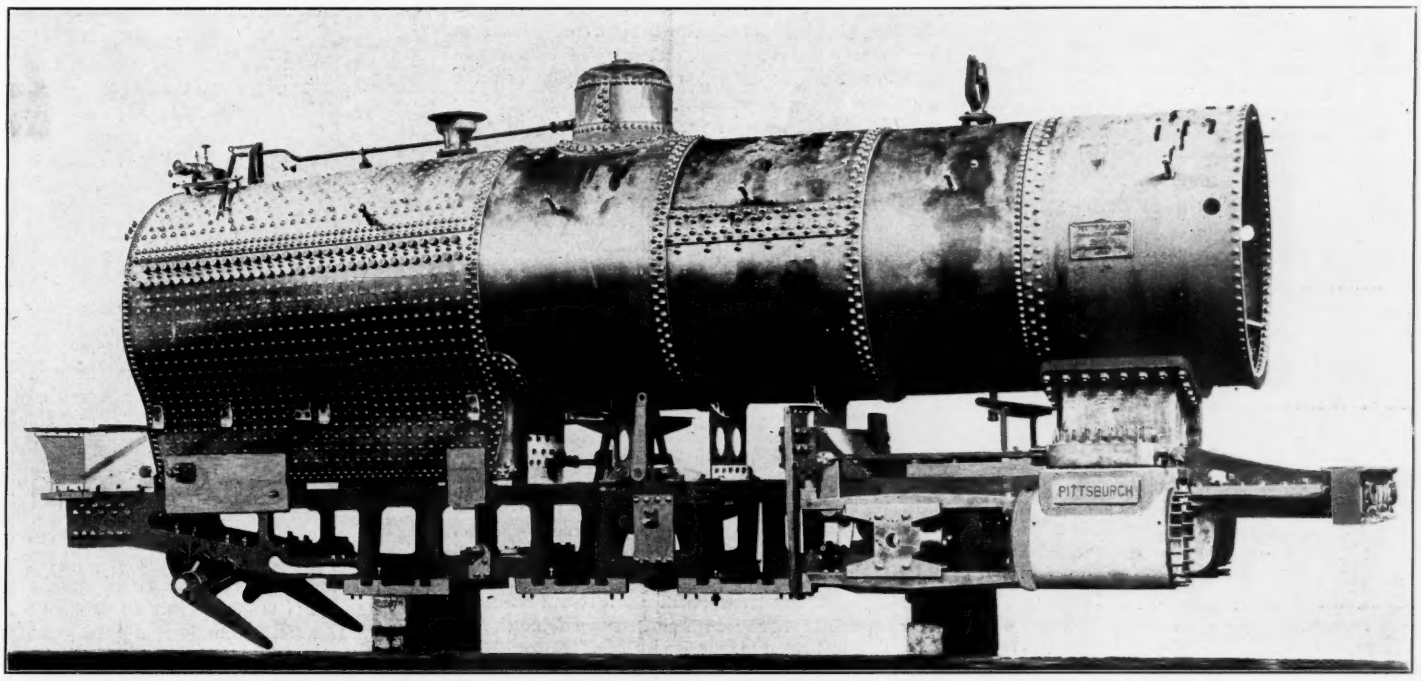
in France lately of trains being behind time; and the Parliament and the Minister of Public Works have attempted to deal vigorously with the subject. Doubtless, the liability to damages for delay, if the decision of this court shall be sustained, will do more than any number of laws and decrees to keep the trains on time; but doubtless, also, it will do so by making the time-tables such that under almost any conceivable circumstances the trains can make time; that is, by limiting them to a moderate speed. There is one fundamental truth generally ignored by the public and not always appreciated by the railroad managers, that if a train is timed to run at the highest attainable speed under favorable circumstances, it must necessarily get behind time when circumstances are unfavorable.

Recently the great French companies, previously not noted for speed, have been running some of the fastest trains in the world. Such trains, if they keep time themselves, on a busy road, are likely to play the dickens with the times of other trains; and a mixed train stopping to put freight off and on and to switch cars, is out of place on a line which has traffic enough for more than one train a day.

The Pittsburgh, Bessemer & Lake Erie Consolidation Locomotive No. 150.

Amplifying the illustrated description of Pittsburgh, Bessemer & Lake Erie consolidation locomotive, No. 150, published in the *Railroad Gazette*, June 29, page 447, the accompanying engraving is produced. The Pittsburgh Locomotive & Car Works have sent three excellent photographs, showing the shop development of this engine from the naked boiler, through the assemblage of frames, cylinders and saddle, to the mounting of the boiler upon the saddle and frames, with cylinders and cross-heads in place. The latter stage is shown in the photograph reproduced.

The engraving suggests the tremendous strides in this industry. Line drawings are not yet available.



Pittsburgh, Bessemer & Lake Erie Locomotive No. 150 When Nearing Completion.

Oil Engines for Train Lighting.

BY ALTON D. ADAMS.

Electric lighting has not reached much success on steam railroad trains. Various combinations of electric equipment have been tried without satisfactory results. Among the expedients have been dynamos driven by special engines in baggage cars, and dynamos driven from the axles of the several coaches, storage batteries as auxiliaries to dynamos on trains and storage batteries charged by dynamos at stations. All of these combinations are too great in first cost, too expensive to operate or give unsatisfactory service. The desideratum for a system of electric lighting on steam railroad trains is moderate first cost, complete independence of motion or the speed of travel, also of the coupling or uncoupling of coaches, low operating and maintenance expense and no drag on the locomotive power. These conditions imply a separate dynamo for each car, driven by a source of energy entirely independent of locomotive steam or train motion. They apparently exclude the storage battery in its present state, because of high first cost and rapid deterioration.

A separate dynamo for each car involves only a very moderate first cost and a trifling amount of attention in operation, so far as the electric machines alone are concerned. The main problem for this arrangement is to select a satisfactory motive power. As steam is not to be taken from the locomotive, a steam engine for each dynamo is impracticable, because of the room and care required by small boilers. Three other prime movers remain to be considered for the present case, gas engines, gasoline engines and petroleum engines. Either of these prime movers requires comparatively little room and only a very moderate amount of attention. Two possible locations for a small direct-connected dynamo and engine on each car readily suggest themselves. The better plan seems to include a small compartment at one end of the car, to contain the generating set. If a room cannot be devoted to this purpose, the engine and dynamo may be located in a closed space beneath each car and the handles of valves and regulators necessary to start, stop and control these machines extended to a convenient point on the interior of the coach. Engines and dynamos for car lighting, under the conditions just pointed out, would have some special features as to automatic lubrication, cooling of engine cylinders and minor details, but there would be nothing to render their first cost excessive.

Gas, gasoline and petroleum engines present material differences as to danger from accident, and these are entitled to much weight in a selection for car lighting. Gas engines that consume a regular manufactured gas, from suitable tanks, need give little concern as fire or explosion risks. Gasoline stored in tanks for the supply of engines presents a certain element of danger, owing to the low temperatures at which its vapors are evolved and ignited. It seems probable, therefore, that the risk attendant upon use of gasoline, slight though it be, should preclude such engines for train lighting. Oil engines using the less volatile products of petroleum, such as kerosene and heavier oils, are not subject to the same objections that attach to gasoline and are regarded quite as safe as regular gas engines under good conditions. So far as required care and skill in operation are concerned, oil engines are certainly not more exacting than those using gas.

With a suitable gas or oil engine and dynamo on each car for electric lighting, there seems no doubt that the regular train crews could give all necessary attention for regular operation. At the end of each day or run, the generating set on each car should be inspected by a competent mechanic.

Coming to the cost of fuel consumed in operation for a given illuminating effect, the gas-driven engine and dynamo may fairly be compared with the present system of train lighting by compressed gas. To make this comparison readily it may be assumed that the gas reservoirs now in use be retained on cars and a small gas engine and dynamo added, this engine in each case to be supplied from the gas reservoir.

The point to be ascertained is the relative amounts of illumination that may be obtained from a given amount of gas, by burning at the open flame or by combustion in the cylinder of a dynamo engine. As is well known, pure oil gas is used for car lighting and is transported in cylinders under pressure to reduce its bulk. At the pressure of the air, a cubic foot of pure oil gas yields a light of about 12 candle power during one hour. One cubic foot of this same gas at the open air pressure contains as much as 1900 heat units. Even the small gas engines, that would be used for lighting individual cars, will deliver one brake horse power hour on a consumption of gas containing not more than 14.250 heat units. A suitable small dynamo would easily show an efficiency of 75 per cent., so that one electrical horse power hour would be delivered at the dynamo terminals for a combustion of gas containing 19,000 heat units, in the engine cylinder. One electrical horse power hour is the equivalent of 746 watt hours, and three watts are sufficient to maintain one candle power in incandescent lamps. The 746 watt hours therefore produce 248 candles of light during one hour, in electric lamps. This amount of electric light, resulting from 19,000 heat units in the cylinder of the gas engine, requires 10 cu. ft. of pure oil gas. As seen above, oil gas yields 12 candle power hours per cubic foot at the open gas flame, so 10 cu. ft. will give 120 candle hours. This amount of gas, giving 248 candle power hours when used in the dynamo engine, is there twice as effective for illumination as when burned at the open flame. It thus appears that if an engine and dynamo be added to the gas reservoirs on cars, as a part of the lighting equipment, about one-half of the present amounts of gas will be required.

As is well known, however, compressed oil gas is rather expensive, and it seems probable that either the light or heavy petroleum oils will prove a much cheaper fuel for gas engines. The net cost of manufacture and compression for pure oil gas is subject to some variation, but it seems fair to take $2.50 per 1,000 cu. ft. for an average figure. At this rate one electrical horse power hour has a fuel cost of 2.5 cents. In quite small gasoline engines, one-eighth of a gallon of gasoline is sufficient to develop a brake horse power hour. Allowing an efficiency of 75 per cent. for the dynamos, as before, the gasoline used per electrical horse power hour at the dynamo terminals is .17 gallon. At the rate of 8 cents per gallon the cost of gasoline is thus 1.36 cents per electrical horse power hour. Though this figure is little more than one-half of that above found for gas, the extra risk of gasoline may prevent its use on railroad trains. The heavier petroleum oils are even less dangerous than gas as a fire risk under the conditions of use in engines. Figures for the quantity and cost of kerosene consumed in oil engines, per electrical horse power hour at the dynamo terminals, are nearly the same as for gasoline. An oil engine and dynamo on each car would save the entire first cost of present gas equipments and nearly one-half of their expense for fuel. No storage batteries would be necessary as the engine and dynamo could operate, whatever the condition or location of each car. The wiring of each car would be complete in itself and no electrical connections would be necessary between the cars of a train.

Foreign Railroad Notes.

Russian engineering parties since spring opened have made surveys for two railroad lines in North Persia, under the new concessions. The route selected for one is 181 miles long, through Erivan, Schach-Tachtay, Choi, Salmas and Irmia; for the other, from Erivan through Julja-Marand to Tabris.

A Swiss engineer, named Ilg, who had lived long in Abyssinia, and had the full confidence of King Menelik, acting as agent in purchasing arms, etc., in Europe, in 1897 obtained a concession for building a railroad from the coast to the Abyssinian town Adis Abeba. The chief opposition to the concession came not from natives but from Europeans, with whose schemes for exploiting the country it promised to interfere. Then, when a company was formed, every one wanted to be assured a share of the profits, but no one was willing to put any money in it; but Ilg at last succeeded in getting means to begin the work at the end of 1897, and in an address at Jurich recently he said that in July of this year 70 miles would be open for traffic, and by the close of the year 106 miles, to Harrar. This is, perhaps, more important than most African railroad enterprises, for Abyssinia has a climate in which white men can live, if the Abyssinians will let them.

The Bagdad Railroad, for which Germans have a concession, is said to have traffic resources on its northern half; but from Aleppo to Basra, through Mesopotamia, there is now scarcely any agriculture and a scattered half-wild population, some pasturing a few sheep, and the rest lying in wait behind rocks to rob chance passers of their few belongings. To make the road pay agriculture must be created.

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EDITORIAL ANNOUNCEMENTS

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

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The wide and constantly growing use of electrical power in railroad work makes it plain that motive power officers already need some means by which they may determine efficiency and may account for electrical power units employed, as readily and as accurately as for direct steam-driven work. As of value in this connection, we publish on another page of this issue a description of a simple transmission dynamometer that is capable of adaptation to many railroad electrical plants.

The plan of holding all sessions of the Master Car Builders' and Master Mechanics' Associations within one week appears to have been successful this year in every important particular. Much time and expense were saved, and probably each individual who attended was sure of seeing a larger percentage of the men whom he wanted to see, as the attendance was concentrated within six days. The only objection that we have heard is that attendance upon the sessions became fatiguing. There was no one free day in the week, and a number of people have said to us that it would have been better to begin the sessions in the middle of one week and end them in the middle of the next week so as to have a Sunday for rest. Perhaps this is a good suggestion; at least it is worth thinking about. At any rate, it would seem only fair if the present plan is kept up to alternate the sessions; that is it might be well one year to have the sessions of the Master Mechanics' Association precede in time those of the Master Car Builders' Association, and reverse the order the next year. Some of the motive power men have said that they had begun to get tired of attending meetings and listening to reports and discussions and taking part in them before the end of the week. They did not come to the Master Mechanics' meetings with the same freshness of mind with which they came to the Master Car Builders' meetings. Perhaps the point is not very important; but, while the matter of developing the greater usefulness of these associations is before people, it may be well to consider these suggestions.

Two Score Street Railroad Passengers Killed.

The street railroad disaster at Tacoma on July 4, in which forty passengers were killed, once more illustrates the narrow margin of safety which, apparently, is accepted as sufficient by many companies running electric street cars. Only last August we had to record a similar wreck at Stratford, Conn., killing twenty-nine. That such serious accidents must be of general public interest—so far as the public gives attention to its own safety—is apparent when we recall that nearly everybody living in or near a city can cite from his own recent experience one or more instances of crowded trolley cars being run down steep hills under what seem dangerous circumstances. By dangerous circumstances we mean high speed, weak brake power, sharp curves, light track and steep grades. But though the public is convinced that electric railroads ought to be made safer, public sentiment does not find any way to express its wishes. The steam railroads have in 60 or 70 years learned by costly experience to guard fairly well against crushing whole carloads of passengers at once, and we may perhaps expect that the electric roads will learn somewhat faster than our fathers did; but that is pretty cold comfort.

With the McDonough catastrophe of June 23 fresh in our memories (June 29, p. 456)—where, if the number of cars in the train had been one less, there would undoubtedly have been no living person left to tell the tale of the disaster—it will not do to say too confidently that the managers of the standard railroads of the country can give the street railroad men an infallible rule for avoiding smash-ups; but in spite of this it remains true that the high degree of safety which now characterizes steam railroad travel is the result of severe and repeated lessons well learned; and that many electric companies with their eyes wide open appear to be constantly ignoring these lessons. How is it that the street roads do not study these lessons? Is it because the differences in circumstances, as compared with early steam railroads, make the lessons inapplicable? It is hard to believe that any man capable of superintending fifty men should take that superficial view; but even if he does so he must at least recognize the force of the rule, applicable to the most primitive experiments in transportation, that the larger the number of persons in your custody the greater the necessity of safeguards; that the fewer men on guard against any danger the higher should be the efficiency of those few.

The first generation of railroad men learned some of their lessons about managing cars on steep grades in the same way that the same lesson is being taught now—by runaways. But there was this difference, that vehicles were heavier and stronger, and were run in trains, and that they carried fewer persons to the lineal foot than is now the case on street lines. The lesson of a runaway ought to be the same, whether the victims be few or many; but experience sadly teaches that it is not; and after seeing a disaster like Tacoma, following so soon after Stratford, one wonders whether even great disasters now teach the lessons which they have been supposed to teach.

But on the lowest possible estimate of the sense of responsibility in managing officers one would suppose that we should see heed paid to the elementary considerations which we have suggested: with an engine, a baggage car and two or three passenger cars, we may be careless with the brakes and still kill only a half dozen, where the same carelessness on a street car, run singly, will kill a score; with five men on a train familiar with and having some control of the (hand) brakes, recklessness is only one-fifth as likely to be punished by disaster as when the whole braking power is in one man; with 100 passengers packed in a light-frame 30-foot car a derailment is pretty sure to be more fatal than where forty passengers are carried in a strong 0-foot car, with other cars and an engine in front of it; with the whole responsibility centered in one motorman elementary common sense would decide that the training of that man should be better than that of the ordinary brakeman, whereas the fact seems to be that usually it is not so good. It is perhaps brutal to consider the protection of human life on this mathematical basis, but repeated examples of transportation companies waiting until they kill a score of passengers before adopting safeguards which had long been known to be necessary, seem to make it the only appropriate basis.

The details of the Tacoma disaster add little to the account which came by telegraph. The outer rail of the curve was badly worn; there was some question about the supply of sand, and whether the motorman was able to use it; and other details were discussed; but the main issue is not changed.

The grade was steep, so steep that the most efficient brake power should have been provided, and duplicate brake apparatus was demanded; there was a sharp curve at the foot of the hill, making the brake question doubly important; and this curve was on the brink of a ravine, making the brake question a question of life and death *on every trip.* Steam railroad men learned many years ago not to run a passenger car down a steep grade by itself, singly. Street railroad men do it now in hundreds of places every day, and risk ten times as many passengers' lives as ever the steam railroad men did. The reproach that 10-ton electric cars are run at 20 miles an hour with only the same care, discipline and safeguards that were found necessary with 3-ton horse cars, moving at eight miles an hour, seems to be justified in a great number of cases. In the highway, every citizen, whether a pedestrian or driving with his own carriage, is subject to the danger of collision with bicycles ridden at high speed by waiter-boys and nurse-girls who have no experience with moving bodies at high speeds or knowledge of the risks they are taking. This is an every day marvel, constantly reminding us how slowly and with what difficulty we civilize ourselves. But riding in street cars one often finds himself under the power and control of about the same kind and degree of ignorance that we see on the bicycle, and handling a far greater amount of accumulated energy; and passengers in a crowded car are deprived of the poor resource of jumping off into the ditch.

Car Lighting by Electricity.

On another page will be found an article suggesting a plan for lighting railroad trains by electricity, using an oil or gas engine and a dynamo in each car. The suggestion is novel, but apparently impracticable, and it gives an opportunity to say a word or two about electric lighting of railroad cars which may be of particular interest at a moment when the subject is receiving much attention. We shall not try now to make any complete study of this somewhat complicated matter, but merely to present a few facts as to the present state of the art.

It is quite true, as Mr. Adams says, that no electric system yet tried has been successful. Light has been produced, but it has been at such cost as to make it impracticable. After years of experiment and after the expenditure of large sums, there is not running now on the railroads of the United States a single electric lighting system that is a demonstrated success, or that has passed the stage of experiment. We say this with all respect, especially, for the gentlemen of the Chesapeake & Ohio, who continue to use the storage battery system of lighting, and who have reasons for so doing that seem to them good and sufficient, and we are in the habit of thinking that whatever they do is well considered.

There are three methods of lighting cars by electricity which have been tried in this country on a considerable scale.

Lighting by a dynamo in a baggage car, run by a small engine taking steam from the locomotive, has been tried for a long time on a number of railroads and on many trains. A variation of this has been tried which consisted in carrying a dynamo in a special car or special compartment. This, however, has been tried on but one road so far as we know, the Chicago, Milwaukee & St. Paul.

This method of generating current by a central plant in the baggage car is still the one reliable method adopted on all trains of luxury where the electric light is used as an attraction. Nearly every one admits that it is a luxury and that it is impracticable in cost except for luxury trains on competitive runs. Nearly everyone, we say, for we believe there are still one or two excellent engineers who do not quite admit this. The greatest single element of cost in this system is exactly the element that Mr. Adams' scheme would multiply several times, namely, the cost of running and maintaining the electrical apparatus and the engine. It is true that each car must be fitted with auxiliary gas to be used when the car is cut off from the generating apparatus, but this is not a special hardship, for pretty nearly all railroad cars lit by electricity have auxiliary gas, whatever the electric system.

Only one experiment with storage battery lighting (that is, batteries charged at a central station), has been carried out on a large scale and for a considerable time. Several minor experiments have been made and abandoned, but the Chesapeake & Ohio has been lighting a large proportion of its passenger stock by storage batteries for some years. We believe that this method is not now used on any other road. We have seen no recent report of results on the Chesapeake & Ohio.

We have always seen, or thought that we saw, serious objections to this method of car lighting, and apparently other people have seen the same inasmuch as it is not extended. The weight is considerable, namely 3,000 pounds of storage battery for each car for a round trip between Cincinnati and Jersey City. This makes a good many high speed ton-miles in the course of a year. The difficulty of handling the cells in and out of the cars at the terminal station is a serious matter. They must be taken out, put on the charging bed, tested, repaired if necessary, and charged, while fresh cells must be put in every round trip. To handle a ton and a half of this kind of material in and out of every car at the end of every through run would, we should suppose, be impracticable at a great terminal where a large equipment comes in, but, on the other hand, if the equipment using the terminal is but small, the cost of maintain-

ing the inspection, repair and charging service is proportionately greater. However, we are not making a study of relative costs, nor in fact are we making a study at all. We are simply running superficially over the subject and stating some observed conditions, and shall not stop now to discuss Mr. Adams' statement that the storage battery is out of the question because of its high first cost and because of rapid deterioration.

The third system of electric lighting is by what we may call axle lighting. Everyone knows now what that means. Several experiments in this method are going on in the country. One great experiment covering a long time, many cars and a great mileage, has been carried on in this country, namely, on the Atchison, Topeka & Santa Fe. From 80 to 100 cars were fitted with the axle apparatus connected up first with belts. This belt connection was so costly in maintenance and so unreliable in performance that after a long trial it was abandoned and refitting with a friction drive was begun. This latter has now been abandoned, and what the company calls a flexible gear is being introduced. This has recently been described in the *Railroad Gazette*. Several other axle lighting systems are under trial on a few roads, but we risk nothing in saying that all of them are still experimental, and we need now express no opinion as to their future.

We come now to the suggestion of using an oil engine and a dynamo in each car. The first proposition is that "it involves only a very moderate first cost and a trifling amount of attention in operation, so far as the electric machines alone are concerned." This is a brief assertion and unsupported, and we may make a similar one, brief and unsupported, that the first cost would be inadmissible, and the cost of inspection and maintenance would be prohibitive if the equipment were presented to the railroad companies. The fuel cost would be only a small element in the cost of operating, inspecting and maintaining such a system. On the luxury trains, which have carried one dynamo to each train, the cost of attendance on and maintenance of the electrical equipment has been such as to put this method of lighting out of the question, except, as we said at the outset, for trains of a limited class, in competitive service, where the cost of electric lighting may properly be charged up to advertising account. But it is now proposed to multiply this operating and maintenance charge anywhere from five to twelve times on each train. Furthermore, it is proposed to put on each car a gas or oil engine to drive the dynamo. Who is to care for these on the road we are not informed, but it is suggested that "at the end of each day or run the generating set on each car should be inspected by a competent mechanic."

We need not follow this novel plan further. Of all the schemes of electric lighting for railroad trains it seems to us the most costly and the least mechanical, and as we have seen no electric lighting scheme has yet been shown to be at once cheap enough and reliable enough to take the place of lighting by compressed gas.

The question of relative safety need not enter at all, for no one who is informed as to the state of the art looks on either as dangerous. The danger of gas lighting is purely imaginary. Probably it is even less than the danger of setting cars on fire by crossed wires or bad insulation, and no competent electrical engineer will admit that there need be any such danger. Compressed gas has been used in the United States for car lighting thirty-four years, and we have never yet been able to discover one case in which it has started a fire in a wreck. There have been two or three explosions due to carelessness about leaks, and cars have been burned by defective insulation of electric wires; but humanly speaking both are safe.

Railroad Gross Earnings for the Half Year and for June.

Railroad gross earnings for the first six months of 1900, according to the figures presented in the latest issue of *The Chronicle*, put the half year among the best in railroad history, if it does not pass all other periods. Both in gross amount and in ratio the improvement over the corresponding period of 1899 is very large; and this, too, after notable increases in 1899 and 1898. Returns for the six months from 117 companies operating 103,982 miles of road show gross earnings of $335,081,413 for the six months of this year, against $294,922,110 for the corresponding period last year, a gain of $40,159,303, or 13.61 per cent. There are 76 additional roads aggregating 61,774 miles, for which the figures for the first five months of the year only are obtainable. These show gross earnings of $258,083,273 for the five months of 1900, against $225,980,700 for the corresponding period last year. This is a gain of $32,102,573, or 14.21 per cent. Combining the earnings of these 193 roads, comprising 165,756 miles, the gross earnings for 1900 are $593,164,686, against $520,902,810 for the corresponding periods of 1899, making the gain $72,261,876, or 13.87 per cent. This follows $30,239,414, or 6.21 per cent. improvement in 1899, and $57,440,505, or 13.13 per cent. gain in the first six months of 1898. There was a slight decrease of $1,266,174 in 1897, preceded by an increase of $20,061,481 in 1896, and $12,232,536 in 1895. Based on the figures for 165,756 miles *The Chronicle* estimates the increase of the entire system of United States roads for the six months at between $85,000,000 and $90,000,000, against an estimated increase of $40,000,000 in the first half of 1899, and $70,000,000 in the corresponding period of 1898. This is a gain of $200,000,000 for the three half years.

Among the 117 roads reporting for six months there were 65 whose gains exceeded $100,000. Of the 76 reporting for five months, 32 showed gains exceeding $100,000. In none of the 193 roads were there losses amounting to $100,000, and only 23 of the whole number reported any decreases at all. The Illinois Central leads the roads reporting for six months with gains of $2,545,982. The New York Central follows with $2,312,414; the Great Northern, $2,189,927; the Northern Pacific, $2,068,107; the Southern, $1,825,204, and the Louisville & Nashville improvements of $1,708,771. Of the roads reporting for five months, the Pennsylvania, East and West, leads with improvements of $9,601,000; then follow the Baltimore & Ohio, $3,324,136; the Atchison, Topeka & Santa Fe, $2,651,491; the Southern Pacific, $2,145,364; the Lehigh Valley (including the Lehigh Valley Coal Co.), $1,842,199, and the Chicago, Burlington & Quincy gains of $1,713,427.

The improvement continued throughout the entire half year, and was large in both ratio and total for each month. February showed the largest improvement, being based upon a decrease of the month in 1899, due to the blizzard of that month. The figures by months for the six months are as follows:

EARNINGS BY MONTHS.

Period	Roads.	Mileage. 1900. Miles.	Mileage. 1899. Miles.	Earnings. 1900. $	Earnings. 1899. $	Increase. $	P.C.
Jan.. .	109	99,922	91,459	50,727,792	44,056,674	6,671,118	15.14
Feb. .	107	98,194	95,934	46,165,122	38,515,257	7,649,865	19.86
Mar. .	117	103,930	102,010	51,084,803	50,742,611	6,342,222	12.50
April	117	102,004	99,964	52,891,379	46,937,958	5,953,421	12.69
May . .	120	102,360	100,413	56,009,101	50,607,713	5,401,988	10.67
June .	113	100,150	97,779	52,310,004	48,445,209	4,470,798	9.23

This table shows a relative falling off in the figures for June, 1900. The increase on 113 roads was $4,470,798, or 9.23 per cent. over the gross earnings of the month in 1899. A year ago, however, the increase was unusually large, $5,988,008, or 14.06 per cent., and upon this improvement the figures for 1900 are based. Among the 113 roads reporting for June this year there are 34 showing increases of above $50,000. Only one, the Louisville & Nashville, reports a decrease of above $50,000, and but 20 altogether show decreases. In increases the Great Northern leads for the month with $356,423; the Illinois Central has an increase of $272,878; the Buffalo, Rochester & Pittsburgh, $262,952, and the Mexican Central, $251,585.

This improvement for June has taken place in the face of decreased cotton, grain and live stock movements. There was received at Chicago during the month an aggregate of 22,976,471 bushels of grain, against 28,922,411 bushels last year. Cut meats aggregated 16,910,439 pounds, against 19,292,963 a year ago. The receipts of live hogs numbered 712,140, against 839,344 in June, 1899. So, too, in cotton the June receipts this year at the Southern outports were but 51,490 bales, against 110,409 bales last year.

In a somewhat smaller measure the improvements in earnings of the six months have been made with decreasing movements in grain, live stock and cotton. Grain receipts at Chicago for the six months of this year aggregated 118,339,406 bushels, against 126,883,220 in 1899, and 133,419,383 bushels in 1898. Only 95,818,081 pounds of cut meats were received, against 102,024,353 pounds in 1899, and 124,431,439 pounds in 1898. The Chicago receipts of live hogs for the six months of this year aggregated 4,462,126, against 4,544,784 in 1899, and 4,323,800 in 1898. There was a small increase in the deliveries of live stock as a whole, aggregating 134,858 carloads brought into Chicago this year, against 133,542 carloads in 1899. In the cotton movement there was a slight gain in the Southern outport receipts this year. The receipts were 2,285,567 bales against 2,149,965 bales in 1899, but 2,693,907 bales in 1898. The overland shipments, however, were only 679,551 bales for 1900, against 905,692 bales in 1899.

From these facts it appears that the increase in gross railroad earnings for the six months of this year has not been due to increased movements of grain, live stock and cotton, but must in the main be attributed to the general activity of trade. The reactions apparent in many directions relate mainly to orders for the future, and so may be expected to have a much larger effect upon the earnings of the last six months of the year. Among the minor auxiliaries to the improvement for the year may be noted the favorable weather and the improved rate situation. Severe floods were experienced in Texas which had a local depressing effect, but the winter was exceptionally mild, and for the most part free from obstructions of snow and ice to railroad traffic. It was thus in marked contrast to the winter of 1899, which was unusually severe, and contained as well the blizzard of February. Improvements in the rates came quite generally about January 1, except those for the bituminous coal roads, which were not changed till April. These rates were well sustained. Complaints of deviations were chiefly confined to certain traffic from Chicago to the Eastern seaboard.

At the recent annual convention in Boston of local freight agents (reported June 22, p. 419) one agent said that his billing clerks had constantly before them over 300 letters or notices sent by individual consignees giving instructions for billing their freight. For example, a certain firm in Chicago desires to have all its freight from the East come in over the Grand Trunk; and to carry out this wish it issues standing notices, expecting freight agents at Boston, and perhaps 50 other places, to keep such notices constantly before them. As it is out of the question to keep several scores of circulars always in view, the bill clerk's memory is practically the only place where this information can be kept on tap; and as a busy clerk may bill goods for 500 different consignees in a day the effect of this useless burden on his mind can be better imagined than described. We mention this item in the proceedings of the convention, not because this petty abuse is a great and crying evil, but merely to call attention to the fact that the attempt to meet shippers' wishes in everything, legitimate and illegitimate, is constantly increasing the aggregate of the service which is rendered by the carrier for very small remuneration. Different agents and different roads, laboring under the same annoyances ought to combine and at least protest. Some elements of freight office service recently added, such as giving arrival notices to consignees by telephone, represent genuine progress, and a railroad must bear the additional expense without demur; but keeping track of shipping directions, rightfully devolves wholly on the shipper. Shippers ought, for their benefit, to abolish such a petty annoyance. If the railroad is legally bound to obey such notices it must employ more clerks; while if it is not bound by the orders the shipper is merely making trouble for himself and the road. We intended to notice the Freight Agents' convention before now. Their discussions have a good business-like air and the topics dealt with by the local agents at Boston should not be without interest to their superiors. Not all of those topics were of universal interest; but when a prominent member seriously puts forward such a proposition as the abolition of way bills, using in place of the way bill the paper received from the shipper, it can not be said that the Association is merely perfunctory.

NEW PUBLICATIONS.

Journal of Industry and Trade for the Furthering of Russian-American Commercial Relations. New York: The M. S. Friede Company, 320 Broadway.

The enterprising Mr. Sergey Friede has started a journal which, he says, is published with the intention of furthering the commercial relations between the United States and Russia. This journal is to be published on the first day of every month in New York City and in the Russian language. A copy which is before us is doubtless interesting, but unfortunately we cannot read it; it contains, however, many familiar advertisements. The prospectus points out that a great field has opened up in Russia for American goods, but that American manufacturers are discredited and handicapped in Russia because European manufacturers, and especially Germans, fill the market with inferior goods stamped as American. Another fact which works against trade with Russia is that British, French and German manufacturers give long credits. The Russians usually require six, nine and 12 months' credit and do business on that basis, but they are willing to pay correspondingly higher prices, and do pay them. Furthermore, many goods from America are sold first to English commission houses who are better acquainted with the Russian trade than we are, and so buy and pass on the goods, obviously making a profit. It is proposed through this new journal to put the American manufacturer and the Russian buyer into direct communication.

TRADE CATALOGUES.

Light Locomotives.—The H. K. Porter Co., of Pittsburgh, Pa., send a copy of the ninth edition of their catalogue. The catalogue is of convenient form and design, being an octavo and well bound, so that it can stand on the shelves along with other books conveniently, a point which the publishers of trade catalogues would do well to keep in mind, for the information contained in such publications is not of much use unless it is conveniently available. This firm makes an exclusive specialty of light locomotives for steam and compressed air, and these are made in every variety of size and design and for any practicable gage of track, either wide or narrow. One important feature of the firm's scheme of design and construction is the system of duplicate parts. Each locomotive is made interchangeable with all others of the same size and class. The company always keeps on hand (ahead of orders) a full stock of fitted duplicate parts for all of its standard designs and sizes. Thus deliveries can be very prompt, either of finished engines or parts for repair. Furthermore, it is the practice of the company, and has been for a number of years, to carry in stock complete locomotives for 36 and 56½-in. gage suitable for contractors' use, logging roads, plantations, etc. When these are sold others are immediately put under construction to replace them. Thus, altogether, the company is always in position for prompt deliveries. An-

other specialty of this company is overhauling and repairing locomotives.

The catalogue before us contains a synopsis of the standard specifications of the company and of the physical tests to which its materials are subjected. The body of the book contains illustrations of engines, class by class, and facing these illustrations are excellent tables of dimensions, weights and capacity with, at the head of each column, a code word permitting specifications to be sent accurately by cable or telegraph. The special chapter on compressed air haulage is of considerable value, as are the pages giving information as to tractive force, hauling capacity, etc.

Injectors.—The Hayden & Derby Mfg. Co., Liberty street, New York, have issued a new price-list and catalogue dealing with the various types of Metropolitan Injectors and H. D. Ejectors. In addition to a detailed description of the Metropolitan automatic injector, Metropolitan "1898" injector, and Metropolitan double-tube injector, the pamphlet contains information on injectors generally with suggestions as to type and size injectors for satisfactory and economical results. Special attention is directed to what injectors of the company's manufacture will accomplish under various conditions, and the different forms of H. D. ejectors are illustrated and described. Copies of the catalogue may be had on application.

The Buda Foundry & Manufacturing Co., Chicago, has issued a new illustrated catalogue, 132 pp., of railroad and contractors' supplies. Illustrations are shown of steel wheels for hand and push cars, and various styles of hand and push cars and inspections cars are given with lists of repair parts arranged for convenience in ordering. In the same way are shown dump cars and plantation cars, warehouse trucks and baggage wagons. Then follo track gages, track drills, switch stands, wrecking frogs and other track material, station and caboose stoves, and pneumatic and mechanical crossing gates. There are also a number of tables of information.

The U. S. Wind Engine & Pump Co., Batavia, Ill., has issued a catalogue of 194 pages; the book is well illustrated and has a subject index and an index to illustrations. This company makes a variety of wind mills, power and hand pumps, water tanks of wood and steel, railroad water station machinery, gasoline pumping machinery and all kinds of fittings and tools needed about pumping plants. This large book is known as the "Trade Catalogue" and in addition special catalogues and circulars are printed for those who are interested only in one class of machinery.

Presses and Dies.—The Ferracute Machine Co., of Bridgeton, N. J., sends a catalogue, No. 13, referring to nearly 500 kinds and sizes of foot and power presses, lathes, beaders, dies, etc., for working bar and sheet metal, paper, cloth and leather. The special machines made by this company are so well known that it is not necessary to do more than to mention the catalogue, which may be had on application. Wide experience and great ingenuity have gone into the design of these tools.

Exhaust Fans.—The American Blower Co., Detroit, Mich., issues sectional catalogue No. 112, descriptive of exhaust fans. It shows fans designed to remove shavings and dust, to raise and distribute cotton and wool, to carry away smoke and fumes and for special heating and drying plants. These fans are shown in detail and assembled. The catalogue also shows an engine designed for driving fans and blowers.

The Farr Telephone & Construction Supply Co., 357 Dearborn street, Chicago, has issued a catalogue of telephones, switchboards, batteries and supplies of all kinds required in the construction and maintenance of telephones and telephone lines. The Farr telephones are now in use in numbers of large manufacturing plants in addition to use in telephone exchanges.

TECHNICAL.

Manufacturing and Business.

The Atchison, Topeka & Santa Fe has ordered four large steam shovels from the Lidgerwood Mfg. Co.

Gen. Frederick C. McLewee has been engaged to represent the American Steel Casting Co., of Chester, Pa.

J. W. Oliver, President of the American Machinery Co., Grand Rapids, Mich., has left for a three or four months' trip abroad.

The Thomas C. Basshor Co. has been incorporated under the laws of Maryland, succeeding the firm of Thomas C. Basshor & Co., dissolved June 4. Harvey Middleton, late General Superintendent of Motive Power of the Baltimore & Ohio Railroad, is President, and C. Hazeltine Basshor, late with Thomas C. Basshor & Co., Vice-President and General Manager of the new company. The company will make and deal in boilers, engines and pumps; steam and water heating; and high-pressure piping for power plants and machinists' supplies; and will also do a general engineering and contracting business, furnishing supplies for railroads and steamships.

In our issue of July 6 we stated that the Carlin Locomotive Works had been organized with a capital of $150,000 to erect works in Pittsburgh to build light locomotives. The main building will be of steel, and measure 75 ft. x 200 ft. It is expected that the plant will be working within the next two months. The product of the company will include locomotives for contractors, switching, plantations, rolling mills, steel works and mining purposes. A. A. Bradeen, formerly in the shops of the Lake Shore & Michigan Southern, at Cleveland, Ohio, will be Superintendent of the plant. The general offices of the company are in the Lewis Building, Pittsburgh, Pa.

Iron and Steel.

The Eastern Railway Co. of France, according to report, will soon buy 4,000 railroad wheel axles, 7,500 tires, 7,500 wheel centers and other iron and steel material. Bids are asked for early delivery.

In our issue of March 16 we mentioned the incorporation of the Portland Iron & Steel Co., of Portland, Me., giving a list of the Directors and officers. Work of building the mills for the company at South Portland was begun early in April under the direction of Wm. S. McGowan, Jr., Secretary, Treasurer and General Manager of the company. On June 29 the 10-in. mill was started, and it is expected that the bar mill and puddle mill will be finished August 1. Charles T. Means, of the Manchester Locomotive Works, is President of the company. The product of the plant will include merchant bar iron, angle iron, railroad spikes and angle and plain fish plates.

A. M. Crane, General Manager and Assistant to the Chairman of the Board of Directors of the American Steel & Wire Co., has resigned; also Charles T. Boynton, the General Sales Agent, has resigned. The places of Messrs. Crane and Boynton have been temporarily filled by the appointment of E. C. Lott and Frank Baackes, respectively.

David Reeves was elected President of the Phoenix Iron Co. at the annual meeting June 26. The following were elected Directors: David Reeves, William H. Reeves, George C. Thomas, Edward T. Stotesbury and J. Lowber Welsh. The new board reorganized and elected George Gerry White, Secretary, and George C. Carson, Jr., Treasurer.

The Tickokan Iron Co., Limited, is reported incorporated in Canada, with a capital of $1,000,000, with office at Fort William, Ont., and the following named provisional Directors: Ronald McLaurin Hunter, Duluth, Minn.; Peter McKellar, Fort William, and Francis H. Keefer, Port Arthur, Ont.

The Nova Scotia Steel Co. is reported building a large steel plant at North Sydney, Cape Breton.

W. J. Mathieson, a Commissioner of Steam Railroads from Victoria, Australia, and several other officials, will soon arrive here. Their object, it is stated, is to place orders for public undertakings. It is estimated that these orders will include a quantity of machinery, supplies, etc. In about a month the exact purchases to be made by these gentlemen will be known. The expenditures will probably reach about $1,000,000.

T. M. Nelson, formerly President of the Pittsburgh Bridge Co., now included in the American Bridge Co., and who became General Manager of the plant, has resigned to devote his entire attention to the affairs of the Nelson & Buchanan Co., Chambersburg, Pa. J. C. Munn, formerly Secretary of the Pittsburgh Bridge Co., has been appointed to succeed Mr. Nelson as manager.

Decision in the Brill Truck Case.

Judge Shipman, of the U. S. Circuit Court for the Southern District of New York, has rendered a decision in the case of John A. Brill against the Third Avenue Railroad Co. The Third Avenue Co. bought in 1894 and 1895 from the Bemis Car Co. 180 trucks of the type styled by the Bemis Co. its "standard" truck. In this there is a combination with the frames of the truck and the usual spiral springs of elliptic springs between the car body and the extension of the frames. This type of truck was patented by Mr. George Martin Brill July 5, 1892. The suit was brought in 1897 against the Third Avenue Co., but was defended by the Bemis Co. The court holds that the Bemis truck infringes the claims of Brill's patent and orders an accounting for damages and profits and an injunction restraining from further infringement. The judge says that "this invention attracted the immediate attention of railroad Superintendents, was found to accomplish its object, and trucks having spiral springs next to the axle boxes and elliptic springs on the extensions of the frames have been universally adopted." In the opinion of the court the invention is broadly covered by the Brill patent.

Steel Cabs.

We have the following further note from Mr. F. R. F. Brown concerning the development of the steel cab: "Sheet iron and steel cabs of small size (not weatherboards merely) were adopted by the late Patrick Stirling, Locomotive Superintendent of the Great Northern Railway of England, where I served my apprenticeship, as far back as 1866. So there is nothing new about them, only a case of enlarging and remodeling to suit requirements and conditions of service."

Thirty-seven Knots an Hour.

The British torpedo boat Viper recently reached a speed of 37.113 knots an hour. She made six runs over a measured mile, and the lowest speed recorded was 35.503 knots an hour. The highest speed is equal to 42 miles. This craft is equipped with Parsons' steam turbines.

Car Heating Litigation.

The Gold Car Heating Co. has appealed from the judgment rendered by Judge Pagnuelo, of the Superior Court of the Province of Quebec, Canada, in favor of the Consolidated Car Heating Co. against Frank E. Came. The Gold Co. state that it is their intention to prosecute the case to the court of last resort.

Lighting Postal Cars.

The U. S. Post Office Department some years ago decided that the two desirable methods of lighting postal cars are by compressed gas and electricity, but that electricity is not available except in rare cases, while compressed gas is very generally available. Therefore, for new cars the Department requires equipment with compressed gas light, and the majority of the United States postal cars which run into cities where compressed gas can be procured, are equipped with the Pintsch system of lighting. The division Superintendents, as a rule, think better of this than any other system of lighting with which they have had experience. One or two of them favor electricity because of their special experience.

Snow Ploughs.

We have the following letter from Mr. J. W. Russell, Manager of the Russell Snow Plow Co. of Boston: "In your issue of July 6 is mention of Wilder's snow plows, stating that Mr. W. E. Wilder, formerly with this company, has brought out several designs of snow plows, * * * especially mentioning one double-end snow plow, also a double-track snow plow. * * * Mr. Wilder worked for us less than a year, when he was dismissed from our service for applying for a patent in his name (during my absence) on a power bar, movable endwise, for use in double-end snow plows. This is part of an invention we claim as ours, as also the whole double-end snow plow, to which it relates. But a few months ago I saw a drawing of Mr. Wilder's representing a double-track snow plow. This drawing showed an important feature in the location of the mold board, which we have had covered with a patent for some years, the validity of this patent never being questioned by any one to my knowledge. I understand it is this feature of the double-track snow plow referred to in the latter part of your item. * * * Snow plows built by us are covered by patents, and we mean to fully protect our customers. We claim further, that a snow plow worth building, especially if anything like hard work is to be done with it, never has been built, and cannot be built, without the use of some features covered with patents owned or controlled by us. We claim that Mr. Wilder owns nothing in the snow plow line worth building. * * * Mr. Wilder has never used a snow plow, or seen one used; he has not a patent on a snow plow or upon any part of one. I find no advertisement of his or of his snow plows anywhere, nor do I find his name in the City Directory of Boston, 1900, yet he gives his address as of Boston."

The Crucible Steel Company.

The manufacturers connected with the new company which represents about 95 per cent. of the crucible steel interests in the country, have elected the following Directors: William G. Park and James H. Park, Park Steel Co.; Herbert Dupuy, of Anderson, Dupuy & Co.; Reuben Miller, President Crescent Steel Co.; C. H. Holcomb, President Sanderson Bros. Steel Co., Syracuse; Benjamin Atha, Benjamin Atha & Illingsworth Co., Harrison, N. J.; Robert E. Jennings, Spaulding & Jennings, Jersey City; James W. Brown, Howe, Brown & Co., Pittsburgh; J. M. May, Beaver Falls, Pa., Steel Works; G. Bruce Harten, Vice-President Singer, Nimick & Co.; Frank B. Smith, President Labelle Steel Co.; Col. L. D. York, Burgess Iron & Steel Co., Portsmouth, Ohio; H. H. Dickey, Cumberland, Md., Steel & Tin Plate Co., Alex. W. Black, of Park Bros. & Co. It is stated that the capital stock of the new company is over subscribed. A committee composed of Reuben Miller, James W. Brown and Benjamin Atha is appointed to work out the details of the consolidation.

Oiling the Roadbed.

In his annual report President Tuttle, of the Boston & Maine, says: "We are paying particular attention this year to the comfort of our passengers. We have had great success with the use of oil or residuum on our roadbed, and have contracted for 1,000,000 gallons for use on the road this year. This material is not inflammable, and in connection with burning of coke on our passenger engines in place of soft coal, makes traveling conditions almost perfect. Under our system of oiling the roadbed we have to go over the road once a year for three years, after which time the roadbed is in perfect condition, so far as dust and overgrowth is concerned, and requires no further attention. It costs us $200 a mile of double track for each oiling, or a total cost of $600 a mile of double track for three years' attention, but I believe this expenditure is more than offset by the lack of hot boxes, caused by sand getting in the bearings, the labor for removing weeds and other growth, etc., not taking into consideration the greater comfort to passengers."

The M. C. B. Coupler Gage.

At the convention of 1899, the Committee on M. C. B. Couplers reported on the desirability of extending the length of the guard arm of the M. C. B. coupler, and by letter ballot this recommendation was adopted as standard. This required a modification of the gage. This modification has been made, and the new gage is now being made by the Pratt & Whitney Co., Hartford, Conn. The price of this modified gage, including the

gage for new knuckles, will be the same as that for the old gage, namely, $35, less 20 per cent. For the contour gage separately, for new couplers, the price will be $23.50, less 20 per cent.

M. C. B. Rules.

The Master Car Builders' Association Rules of Interchange, as revised at Saratoga, in June, which go into effect on September 1, 1900, will be ready for distribution about July 25, and will be furnished at the same rates as heretofore. Those who wish copies of these revised rules should make requisition on Mr. Jos. W. Taylor, Secretary, and specify additional printing on the cover, if wanted.

New East River Bridge.

Bids will be received by the Commissioners of the New East River Bridge, at their office, at No. 258 Broadway, in the Borough of Manhattan, in the City of New York, at 2 o'clock in the afternoon of the 9th day of August, 1900, for construction of the steel and masonry approach on both sides of the New East River bridge. Copies of the specifications and the general drawings for the work, with the proposed forms for the bid, bond and contract, may be seen, and further information will be given at the office of the Chief Engineer, No. 84 Broadway, Borough of Brooklyn, City of New York, on and after the 16th day of July, 1900. The contract is to be completely performed within twelve months after the execution of the contract. As by far the greater part of this work can be executed only by bridge establishments of the first class, bids will be received only from such parties as have the requisite plant and facilities, which have been in successful operation on work of similar character for at least one year. The bidders must be, in the opinion of the Commissioners, fully qualified both by experience and in appliances to execute work of this character and importance according to the highest standard of such work at the present time.

Pneumatic Tools in Great Britain.

Two or three weeks ago we mentioned the fact that the works of the International Pneumatic Tool Co., Limited, had been opened at Chippenham, England. It appears now from a sketch just published in *Feilden's Magazine* that this British company is the product of the enterprise of Mr. J. P. O'Donnell. Mr. O'Donnell, it seems, has acquired the British and Colonial patents of the Little Giant pneumatic tools, and has promoted this International Company and started the works. The works, as we said before, occupy part of the establishment of Evans, O'Donnell & Co., Limited, makers of signal apparatus.

THE SCRAP HEAP.

Notes.

"Show collisions," of old locomotives took place on the Fourth of July at Rochester, N. Y., and Indianapolis, Ind. The newspaper reports indicate rather tame affairs at both places.

A building for the Railroad Young Men's Christian Association costing $5,000 is to be put up at Canton, Miss. The greater part of the funds will be furnished by the railroad company, the Illinois Central.

During the very hot weather of the first week in July the Superintendent of the Central of New Jersey employed an extra fireman on each of the large new 12-wheel locomotives in order to lighten the burden of the regular firemen, and it is said that the helpers will be kept on during July and August.

A press despatch says that the superintendent of the mechanical department of the Baltimore & Ohio at Cumberland, Md., has posted a bulletin in the shops stating that no employee of the department shall be a candidate for any political office or hold any political position without first obtaining the permission of the head of his department.

A train of the Illinois Central was stopped by robbers on the night of July 10 near Wickliffe, Ky., and the express car was robbed of several thousand dollars. The robbers, six in number, detached the express car from the rest of the train and ran forward about a mile. The safe was blown open. The fireman, who offered some resistance, was beaten by the robbers. It is said that most of the party were intoxicated and they dropped several packages of money in their flight to the west side of the Mississippi River. Three suspected persons have been arrested.

Traffic Notes.

The General Agent of the St. Louis Committee of the Southwestern Lines is Mr. E. O. Becker, late Commissioner of the Merchants' Freight Bureau at Galveston.

Chicago papers report that the Chicago & Alton has secured the contract for carrying 500 soldiers from Chicago to San Francisco, and that the rate through is $9.95 per capita. The rate generally charged for soldiers between these cities for a long time past has been $24.50, but it is said that an agreement between the roads to charge a uniform rate has recently been dissolved by the withdrawal of the Atchison road. It is said that the Illinois Central has recently taken soldiers at a rate of $10 through.

A Chicago despatch of July 17 says that grain rates from Kansas City and other Southwestern Missouri River points to the East have been advanced five cents per 100 pounds, and the reporter observes that the rate from Kansas City to Galveston will now be much lower than to Chicago, so that much grain will be diverted to the Gulf ports. At this distance it looks as though the real explanation would be found, rather, in the fact that the Galveston grain outlet is congested. The Atchison is reported to be bidding for grain in Texas for Chicago.

The railroads connecting Louisiana and Texas have made a formal agreement with the health officers of those two states and of the city of Shreveport by which it is hoped that in case of the appearance of yellow fever in Louisiana this year the transportation of freight from one state to the other will be made less troublesome and expensive than has been the case during epidemics heretofore. The agreement specifies certain prominent articles of freight which will be allowed to go through in carload lots. We judge from the terms of the agreement that the health officers reserve the right to back out of it at any moment, and, indeed, to make any new restrictions which they may deem necessary.

Judge Evans in the United States District Court at Louisville, Ky., has granted a temporary injunction in the suit of the Louisville & Nashville and other railroads against the Kentucky Railroad Commission, which will suspend the operation of the McChord anti-extortion railroad bill until its constitutionality can be settled by the courts. This law was designed to give the State Railroad Commissioners extensive powers for regulating railroad charges. The court is said to have held that the law was unconstitutional, because, first, if a road were convicted under it and a new rate fixed the rate would not apply to other roads; second, because the Commissioners cannot determine judicially if a road has been guilty of extortion; third, the Legislature in enacting the law failed to recognize the right of the courts to determine the reasonableness of the rate.

The Merchants' Association of New York City is making strenuous efforts to get reduced rates for retailers in the Southern States coming to New York to buy goods. The Southeastern Passenger Association has declined to make any reduction, but the Seaboard Air Line sells excursion tickets (apparently throughout the summer) to Old Point Comfort, and the Merchants' Association is advising buyers to use these tickets and to proceed to New York from Old Point Comfort by the Old Dominion Steamship Line. The railroads of Texas also turn the cold shoulder to the Merchants' Association, but the Southern Pacific makes reduced rates to New Orleans, which the Association thinks will be advantageous to Texas buyers. A pamphlet has been circulated in Texas setting forth the friendly attitude of the Southern Pacific, and notifying merchants that they can come to New York on these reduced rates, but they will be expected to hand over to the Merchants' Association all goods which they may buy in New York, the purpose of the Association being to make sure that these goods are sent over the Southern Pacific.

To Build Motor Wagons.

The Brooklyn Heights R. R. Co. has leased to the De Bion-Bouton Motorette Co. its car shops at Thirty-seventh street and Church Lane, South Brooklyn, where a factory will be established to make horseless vehicles, equipped with a motor made by the lessee. The motor company was organized several months ago in New Jersey, with a capital of $1,000,000. Those interested are: Fred C. Cocheu, President; James C. Church, Counsel; P. H. Flynn; C. J. Field, Vice-President and General Manager, and A. A. Halsey, secretary and treasurer.

Hot Water for Train Robbers.

One of the New York daily newspapers recently said that "on the new locomotives of the Denver & Rio Grande nozzles have been placed on the roofs of the cabs pointing at the rear of the tender and the platform of the baggage car. These connect to the hot water of the boiler, etc." A note from an officer of the railroad company says that there is no truth in this statement as concerns the new engines of the D. & R. G. About 10 locomotives built by the Brooks Locomotive Works about a year ago were equipped with an arrangement of this sort. It has been removed, however, as it was found to be a patented device. Furthermore, there is considerable doubt as to its practical value.

The Law of Limited Tickets.

The Supreme Court of Georgia has lately handed down a comprehensive decision on the right of a railroad to eject a passenger who refuses to pay fare when the conductor rejects an expired ticket; and the passenger department of the Southern Railway has issued the full decision in pamphlet form. It is in the case of Watson vs. Southern Railway. The Court holds that a carrier has legal right to make reasonable regulations for the conduct of its business; that a time limit is reasonable, as a matter of law; and that where a road makes provision for refunding the purchase price of a ticket if it is unused, or for refunding a fair amount where a ticket is partly used, that constitutes an additional measure of reasonableness.

Fast Run From Rochester to Syracuse.

On the night of July 9 eastbound fast mail train No. 32 on the New York Central & Hudson River, a train of eight heavy cars, was run from Rochester to Syracuse, 80 miles, in 80 minutes, and a stop was made at Lyons. In view of the great weight of the train this is believed to be one of the best runs ever made on the New York Central.

New Steamer Line to Providence.

The Joy Steamship Co., which runs a steamer three times a week each way between New York city and Providence, R. I., and which has been carrying passengers at $1.75, now has a competitor in the shape of a new line, also running three times a week, which has been put on by the New York, New Haven & Hartford Railroad, and which carries passengers at $1 each. The regular fare between the two cities by the regular boats of the old (Providence) line is $3. The New Haven road has also begun aggressive competition with the Hartford & New York Steamboat Line. The agents of the road are soliciting freight in Hartford for New York, to be taken by rail to New Haven, at rates (through) which are little, if any, above those of the Hartford Steamboat.

Electric Tramways in Valencia.

The negotiations for the transfer of Valencia tramways to the Thomson-Houston Co. on a forty-year lease have been brought to a successful issue. The lessees are to substitute electricity for horse traction; to deposit as guaranty of $108,000 in French bonds; to pay a yearly rental of $23,000 while receipts are below 800,000 pesetas. When receipts reach this figure, the lessors are to receive 5 per cent. more, and when they reach 1,000,000 pesetas 10 per cent. The whole electric plant is to be the property of the lessors, who are also to possess the right to devote to public lighting any surplus electricity generated. Electric machinery and plant, as at present arranged, will be supplied by the General Electric Co., but the cars will be built in Spain, where a few factories recently established turn out fairly good and cheap work.

Premiums to Employees.

The Washington Water Power Co., working the street railroads of Spokane, has announced an offer of rewards for faithful and efficient service, which will be open to all motormen and conductors. A premium of five mills an hour will be credited to each man for all the time he works, if his record is clear and no accidents occur. Fines for negligence or misconduct will be imposed, and the amounts of these are to be deducted from the premiums, and the money accruing to the company in fines will be given as extra premiums to employees showing clear records. The plan is explained as follows: Supposing that during the year a total of 250,000 hours are worked by carmen, then a sum equal to half a cent an hour, or $1,250, would be set aside and become divisible among the carmen. Supposing that, in the same period, a man worked 3,500 hours, and had had no accidents and broken no rules, he would then have a premium of $17.50 due him, in addition to his proportion of the fines that had been imposed during the same period. Assuming that the total fines for the same period amounted to $250, then his premium would be increased in the proportion that $250 (total fines) bears to $1,000 (unfined premiums), or one-quarter; therefore, his total premium and share of fines would be $17.50 plus $4.37, or $21.87. Supposing that, during the year, a man had been fined $10, his premiums, then, proceeding as above, would be $17.50 minus $10, or $7.50, and his share in the fines would be one-quarter of $7.50, or $1.89, making a total of $9.37.

Electric Roads in the District of Columbia.

The merging of eleven street railroad companies and two electric lighting companies into the Washington Traction & Electric Co. has culminated this week in an enlarged transit system for the city of Washington and the surrounding territory of the District of Columbia. The syndicate which bought the several properties is composed of New York and Washington men, the purchases being arranged by Frederick C. Stevens, President of the West End National Bank. High prices were paid for the stock, and money has been spent freely in the improvement of tracks, and in the purchase of new cars and the enlargement of power houses. One of the improvements was the changing of the Belt Line of the Anacostia & Potomac River Co. from horse cars to underground electric traction. A part of the consolidated interests are the plants of the United States Electric Lighting Co. and the Potomac Electric Power Co. Connections have been made for longer routes than formerly, and these have been put into operation. All the suburban roads have been closely connected with one another so as to make continuous trips possible from one point to any other point in the District. Under the new arrangement it will be possible to take a street car in Rockville, Md., and, riding down through Tenleytown and Georgetown to Washington, making one transfer, go out in a northeast direction to Hyattsville and Sligo, a distance of more than 24 miles. The total mileage of single track operated by the new company is 163.88, of which 54.04 miles are underground construction and 109.84 miles are overhead work. This does not include 64.10 miles of single track operated by the Capital Traction Co., which did not join the syndicate, and is operated separate therefrom. The new system has in actual use 533 cars, and its power and light are derived from eight power houses employing 28 engines with a total capacity of 17,325 horse power. The officers of the Washington Traction and Electric Co. are: F. C. Stevens, President; George H. Harries, Vice-President; H. D. Warick, Treasurer, and James B. Lackey, Secretary. The capital stock of the company is $12,000,000, of which $10,000,000 has been issued. By act of Congress, approved at the last session, the company is empowered to consolidate the several interests into one corporation, but that step remains to be taken at such time in the future as the company may elect.

The Supply of Gutta-Percha.

Consul Hughes, of Coburg, writes: "The supply of gutta-percha is almost exhausted, owing to the reckless and primitive way in which the trees were treated in Sumatra and Borneo, whence the principal output has come. As these trees will flourish only in a very few places, the question has become serious. The Philippines is the proper place to grow gutta-percha, cheaply and profitably." Golf players will therefore please vote for McKinley and expansion. Other folks can get along with less gutta-percha.

Preventing Incrustation in Boilers.

Consul Hughes sends the following from Coburg: "Mr. A. Reis, of Antwerp, has patented the following method for preventing incrustation in boilers: A mixture of sugar, tannin extract, silicate of potash or soda, and boric acid is added to the boiler water to keep the salts in solution; when the water attains a density of about 15 to 25 Bé, the boiler is 'blown off.' The working periods range from a fortnight to three months, according to the quality of the water in use. Glycerin and alkaline sulphates are sometimes used in the mixture."

Burning of Motor Cars.

In the month of July at least two car fires have been started in elevated railroads by the defects of wiring on electric motor cars. About the 2d an elevated car in Brooklyn took fire, causing great alarm among the passengers and the injury of several in the stampede which ensued. Fortunately, there were no deaths. On the 14th a similar accident happened to a train of the South Side Elevated, Chicago, the passengers being scared into something like a panic. Shortly after leaving the station it was discovered that the car in the middle of the train was on fire. We do not learn, however, that there was any injury other than to the nerves of the passengers. This appears to have been a case of bad wiring.

Don't Spit on the Floor.

The Railway Engineer has something to say about the recommendation of Mr. Rous-Marten, that notices (following the French custom) be posted in railroad coaches forbidding passengers to spit on the floor. After a short eulogy on the non-spitting qualities of "the very great majority" of Englishmen, it is said that "when English people have descended to the French level it will be time enough for English railway managers to adopt French measures." This is startling. It jars. It has been found expedient to post such notices in street cars and public buildings in the United States, and we have long thought that the railroad managements might well follow the example. We do not wholly question the accuracy of the English aim, nor its conservative delivery, but there comes to mind at this moment two or three Englishmen who were able and willing to drown a fly, during intervals of smoking and talking, as expeditiously and at as long range as any men we have ever known, French or Yankee. Better put up the signs.

A Paris Medal for Brake Shoes.

The International Brake Shoe Co., which controls the "Diamond S" brake shoe patents outside of the United States, has been awarded a silver medal at the Paris Exposition. The silver medal is the highest award for a class. This company's exhibit is in the Transportation Building, near the locomotives, and new and worn "Diamond S" brake shoes of various patterns are shown together with records of tests.

Coke as a Locomotive Fuel.

In his annual report President Tuttle, of the Boston & Maine, says: "If there is any question as to the satisfaction of passengers over oiled roadbeds and smokeless fuel, let a person ride on a passenger train using soft coal, and he will quickly feel the pulse of the people. It would be almost impossible for us now to go back to soft coal as a fuel if it were possible to secure a supply of coke."

Failure of an English Warship.

The Practical Engineer has the following statement of troubles of the English warship Hermes on her recent cruise: "Mr. Goschen, in reply to a question by Sir Fortescue Flannery, said the report of the Court of Inquiry on the breakdown of the Hermes had been received. The chief cause of the breakdown was the inefficient state of the feed pumps, which had been allowed to become so defective that they were not capable of supplying the necessary feed water to the boilers. The court state that there is no reason to suppose that the feed pumps were not efficient when the Hermes left the Clyde, but that the slight defects which arose in ordinary work were increased by injudicious treatment. The distilling apparatus was also working unsatisfactorily. The leakage appears to have taken place from various steam and drain pipe joints, and in some cases from split boiler tubes, and also water was being pumped into inversed boilers, and escaping through their safety valves. It would be impossible to make any statement at present as to the responsibility for the treatment which the machinery received, as the report has not yet been fully considered, and the state of health of the staff engineer in charge did not admit of his exercising the necessary supervision. He has since been invalided. The boilers have been seriously damaged by being worked without sufficient water, and a large number of the tubes will require to be replaced. It is impossible to say at present how long the repairs will take."

Percentages of Casualties in Dangerous Occupations.

The bill for the prevention of accidents on railroads is still being discussed by the British Parliament. This bill, it will be remembered, was drawn up by the Royal Commission which investigated the alleged demand for automatic freight car couplers. It included, besides couplers, such matters as hand brake levers on freight wagons, lighting yards where switching is done at night, construction of gage glasses in locomotives, and other topics which have been agitated by employees' associations. The bill has been amended two or three times and now appears to have been made quite stringent concerning all these matters which at first appeared to be secondary, but everything concerning couplers appears to have been completely expunged. Lord James, of Hereford, in advocating the revised bill in the House of Lords, June 28, gave some interesting percentages showing the frequency of fatal accidents in the railroad service and in various other dangerous occupations. He said that in the year 1898 there were 534,141 railroad servants employed in the United Kingdom, and of those persons 542 were killed and 13,000 were injured. But of these 534,141 men many ran no risk at all. There were 53,800 clerks and 77,000 factory mechanics, who ran no risk, while of 25,543 signalmen only 9 were killed and 175 injured. It was demonstrated that a certain portion of the work of railroad operatives represents the most dangerous trade carried on in this country. The persons who were exposed to the greatest danger were goods guards, shunters, and platelayers. Of the 14,720 goods guards employed, 43 were killed and 902 injured; of the 63,360 platelayers employed, 122 were killed and 1,020 injured; and of the 9,244 shunters employed, 47 were killed and 723 injured. Therefore, of the goods guards, about 4 per 1,000 were killed and 61 injured; of the platelayers, 1.9 per 1,000 were killed and 16 injured; and of the shunters, 5.08 per 1,000 were killed and 78 injured. While accidents to railroad servants generally had decreased during the last thirty years, accidents to shunters had unfortunately increased. The number of shunters killed in 1872 was 25, but in 1898 it was 47. The trade which was generally supposed to be the most dangerous was that of the mercantile marine; but while in 1898 there were 5.2 deaths per 1,000 in the mercantile marine and the number of accidents which were not fatal was small. In regard to other trades which had been treated by the Legislature as dangerous, he found that in coal mines 1.28 per 1,000 were killed, as against 5.08 per 1,000 of shunters; in metalliferous mines, 0.96 per 1,000 were killed; in factories in the non-textile trades, 0.2 per 1,000 were killed; in factories in the textile trades, 0.1 per 1,000 were killed; and in the ship-building trade 0.5 per 1,000 were killed. Therefore it was established that the work in which a certain portion of the railway servants were engaged was the most dangerous trade in this country. So far as he knew, it was the only dangerous trade now uncontrolled by the protection of the State. * * *

Chicago Tunnels.

Corporation Counsel Walker has filed a petition for a writ of mandamus to compel the Union Traction Company to lower the river tunnels. The theory on which the petition is based is that the Chicago River is a highway belonging to the state and city. The United States Government, in its capacity of caretaker of navigable waters, has decreed that a depth of twenty-one feet must be maintained.

The Pennsylvania and the Long Island.

Mr. Samuel Rea, Fourth Vice-President, is reported to have said in an interview that "a tunnel under the East River is not unlikely to be taken up and carried out by the municipal authorities. He had no idea that the Pennsylvania Railroad would have anything to do with it. Whether in the future it would ever be deemed wise to build a passenger tunnel from New York to Jersey City he could not prophesy. As for freight tunnels under the Hudson at any point he thought it extremely improbable that any would ever be built. They would require long and expensive approaches, and coal burning locomotives could not be used in them. Nor could freight be handled as cheaply by tunnel as it is now handled by floats. Speaking of the future of the Long Island road he said there would be a big industrial development on the Brooklyn side of the river. Manufactories of all kinds would be built there, and the resulting population and business would build up the towns on the line of the road. While it was without connection with a powerful trunk line it was in no position to bring business to its territory. In the hands of the Pennsylvania Railroad Company it would be in a position to make rates and freight connections which would determine the location of many enterprises on its lines."

Leak in the Erie Canal.

Colonel J. N. Partridge, State Superintendent of Public Works, has information of a leak in the Erie Canal just East of Schenectady and the Mohawk River at Lock 21. The water had got into a quicksand formation and was undermining the masonry. Division Superintendent Parker caused the water to be withdrawn from the level, which will stop all navigation four days or more.

New York-Brooklyn Tunnels.

The State Board of Railroad Commissioners, New York, has set a hearing on August 1, at the Fifth Avenue Hotel in New York City, on the application of the New York and Brooklyn Union Transportation Company and the New York, Brooklyn and Jersey City Rapid Transit Company, for permission to build tunnel railroads from Brooklyn to New York City and Jersey City.

Hay Lake Channel Improvement.

Colonel G. J. Lydecker, Corps of Engineers, U. S. A., was lately in Sault Ste Marie and said that he had received the approval of the Secretary of War for the project to widen the little rapids section of Hay Lake Channel and that bids will soon be advertised for. The project calls for the widening of the channel from 300 to 600 feet at the upper end, making a minimum width of 600 feet through to the foot of Hay Lake. The entire Hay Lake channel will also be deepened to provide 20 feet at the ordinary low stage of water instead of at the mean stage.

New York Rapid Transit.

The New York Rapid Transit Commissioners have decided to lengthen all station platforms above One Hundred and Fourth street and the express platforms below One Hundred and Fourth street to 450 feet, accommodating eight instead of five car trains. It was also decided to widen the subway at Spring street. There is a curve there and a slight widening will admit an additional track. This will permit trains to be shunted back uptown at that point.

Contracts On an Ecuador Road.

J. P. McDonald & Co., of 35 Nassau street, New York, have taken the contract for building 300 miles of the main line between Guayaquil, Ecuador, and Quito. The road is completed for fifty-seven miles, but this section must be reconstructed. Bids are asked on sub-contracts. For the first 100 miles the work will be heavy, being mostly side hill and rock work. The highest point is about 12,000 ft. above the sea. The plans provide for a first-class road of 42-in. gage. About 80,000 cu. yds. of masonry will be required. The Ecuadorian Association, Ltd., of Scotland, with offices at Edinburg, owns the road. A number of bridges will be required, contracts for which will be let by the Ecuador Development Co., 33 Wall street, New York.

The Red Petticoat Once More.

The red petticoat, for some time missed from railroad operations, is restored to its ancient glory and renown. This time it appears in the hand of Miss Mary Cannon, Fayette, Ala. That is, part of it thus appears, the courageous young woman having varied the usual method of its use, in flagging a train rushing to destruction, by tearing off and waving only a portion of the garment. The setting of the scene was made up of a fierce rain and wind storm, a washed-out culvert and an oncoming fast express train. Here's to the red petticoat! Long may it wave!

A Testimonial to Bandmaster Church.

At the Saratoga Conventions of the Master Car Builders' and American Railway Master Mechanics' Associations, a collection was made for the purpose of buying a medal for Bowen R. Church, leader of Reeves' American Band. Mr. Church suggested that he would prefer to have some other token and the committee decided to give him a diamond ring. The ring was transmitted with a letter signed by C. A. Schroyer, President Master Car Builders' Association; J. H. McConnell, President American Railway Master Mechanics' Association, and George J. Akers, Fred A. Casey, G. N. Dow and J. Alex. Brown, Committee.

LOCOMOTIVE BUILDING.

The Seaboard Air Line is preparing specifications for 35 locomotives.

The Southern Missouri & Arkansas has ordered three locomotives from F. M. Pease.

The New York & Ottawa is reported in the market for two fast passenger locomotives.

CAR BUILDING.

The Wabash denies that it is in the market for passenger cars.

The Central of New Jersey is getting prices on some 80,000-lbs. capacity cars.

The Chicago, Burlington & Quincy is figuring on buying some more freight cars, but nothing definite has been decided.

The Chesapeake & Ohio has ordered two postal cars from the Barney & Smith Car Co. Last week, in error, we stated that the Baltimore & Ohio would order these cars.

The Union Pacific and the *Oregon Short Line* have not ordered from the Pressed Steel Car Co. the 1,100 cars referred to in our issue of July 6, published reports to the contrary notwithstanding.

The Atchison, Topeka & Santa Fe is considering buying from 300 to 400 refrigerator cars and from 500 to 600 coal cars. The road has also ordered six dining and two combination cars from the Barney & Smith Car Co., and 120 ballast cars from the Haskell & Barker Car Co.

The Seaboard Air Line has ordered no cars from the Pressed Steel Car Co., as stated in published reports this week, nor is the order likely to be given to the company named, because wooden cars are wanted. At time of going to press Mr. E. St. John, Vice-President and General Manager of the road, was in New York negotiating for the buying of the 2,000 cars referred to July 6.

The Northwestern Elevated (*Chicago*) has ordered 10 motor cars from the Pullman Co.

The Lake Street Elevated (*Chicago*) has ordered 15 trailer cars from the Pullman Co.

BRIDGE BUILDING.

ALGONA, IOWA.—The Kossuth County Commissioners, according to report, propose to build a bridge across the Des Moines River. M. P. Weaver, County Auditor.

ATHENS, ALA.—Reports state that a bridge is contemplated over Elk River to connect Limestone and Lauderdale.

AVOCA, PA.—There will be three overhead bridges, two over railroads and one over a street, built at the new yards of the Erie & Wyoming Valley R. R. at Avoca.

BINGHAMTON, N. Y.—Plans and specifications for a bridge on Hotchkiss street have been adopted by the Common Council and bids for building are wanted.

BUFFALO, N. Y.—Bids are wanted, July 25, for building the abutments, wing walls and protection for a bridge over Buffalo River at Seneca street, including removing the present span and foundation. Estimated cost, $40,000. R. G. Parsons, Secretary Board of Public Works.

CHICAGO, ILL.—New bids are wanted, Aug. 8, for the substructure and superstructure for the Canal street bridge over the Chicago River.

CLEVELAND, OHIO.—Bridge bonds for $50,000 will be sold by Chas. P. Salen, City Auditor, Aug. 13.

CLIFTON FORGE, VA.—Bids are wanted, July 30, for two iron or steel bridges, one 286 ft. long, and the other 175 ft. long; the former 60 ft. wide and the latter 50 ft. The foundation work will be done by the city. John Donovan and J. N. C. Bryant, Jr., are members of the City Council Bridge Committee. (June 22, p. 432.)

CLINTON, IOWA.—H. W. Seaman is interested in a new railroad project across Clinton County which will require some bridges.

COVINGTON, VA.—Bids are wanted, July 23, by E. M. Nettleton, Chairman of the County Commissioners, for a steel bridge 273 ft. long over Jackson River. It is to be of two spans 136 ft. each, designed after Cooper's specifications of 1896.

DANVILLE, PA.—The Pennsylvania R. R., according to report, is surveying for a railroad bridge across the Susquehanna River at this place.

DES MOINES, IOWA.—A county highway bridge is proposed, according to report, over Coon River at Eighteenth street. J. C. Mardis is interested.

EDINBURG, VA.—Bids are wanted, July 24, by the Road Board of Madison District for a 350 ft. combination bridge over Shenandoah River.

FREEPORT, ONT.—It is proposed to build a steel bridge over the branch of the Grand River above this place.

FRENDALE, IOWA.—The Iowa City & Old Man's Creek Valley R. R. will need a bridge about 200 ft. long over Iowa River. M. L. Ferson, of Iowa City, is interested.

GALVESTON, TEX.—The City Council has passed an ordinance empowering the Mayor to ask for bids for building a bridge across the gully on the extension of Houston avenue.

GARDNERVILLE, NEV.—The County Commissioners are considering building a bridge across Carson River.

GREENFIELD, MASS.—The cost of the proposed bridge over the Connecticut River to Northfield is estimated at $41,392.

GREAT FALLS, MONT.—Three steel bridges will be built by the Montana Central for the new Great Falls cut-off. One will be 800 ft. long and 150 ft. high, and the second 3 ft. shorter. The third will be 1,000 ft. long and 85 ft. high. One is to cross the Missouri River.

GUAYAQUIL, ECUADOR.—J. P. McDonald & Co., 35 Nassau street, New York, have a contract to build a railroad in Ecuador which will need a number of bridges. Ecuador Development Co., 33 Wall street, will let the contracts.

JEFFERSON CITY, MO.—Plans and bids are wanted, Aug. 7, for a steel bridge 125 ft. long, according to report, over Moreon Creek. F. W. Roer, County Clerk.

JERSEY CITY, N. J.—Bids are wanted, July 23, by a joint committee of the Chosen Freeholders of Hudson and Bergen Counties for plans and specifications and building a new steel and iron bridge over the Hackensack River on the Paterson & New York Plank Road. Frank Scott, Chairman. (June 29, p. 456.)

JOLIET, ILL.—The City Council, according to report, has adopted ordinances for two bridges, one a plate girder over the canal at Exchange street to cost $15,000, and the other over the river and canal at Jackson street, to cost $27,000. H. A. Stevens, City Engineer.

LETTS, IOWA.—The Railroad Commissioners have ordered an undergrade crossing on the Muscatine North & South (Iowa & Mississippi Valley) about four miles east of Letts.

LOGAN, UTAH.—Bids are wanted, until July 27, by B. P. Fleming, Deputy County Surveyor, for replacing as quickly as possible the superstructure of the 140-ft. Bear River bridge.

LYNCHBURG, OHIO.—Bids are wanted, July 27, according to report, for a steel bridge over East Fork of Miami River between Clinton and Highland Counties, near Lynchburg. J. N. Fisher, Auditor, Clinton County, Wilmington, Ohio.

NASHVILLE, TENN.—The Council has appropriated $50,000 for improving the Broad and Church street viaduct.

NEW BEDFORD, MASS.—The Fairhaven bridge bill, for a bridge over the Acushnet River, is reported signed by the Governor, and it is now believed work will be begun soon. (April 27, p. 277.)

NEWPORT NEWS, VA.—The Alabama Bridge Co., of Decatur, Ala., has the contract for the Twenty-eighth street viaduct over the Chesapeake & Ohio at $84,000. The other companies submitting bids were the Brackett Bridge Co., Groton Bridge & Mfg. Co., Variety Iron Works and the King Bridge Co.

NEW YORK, N. Y.—Bids are wanted, Aug. 9, for the steel and masonry approaches to the New East River bridge, by the Commissioners, at 258 Broadway, Manhat-

tan. Specifications can be had from the Chief Engineer, 84 Broadway, Brooklyn.

Bids are wanted, July 23, by John L. Shea, Commissioner of Bridges, 21 Park Row, Manhattan, for a steel swing bridge 232 ft. over all across Newtown Creek, from Grand street, Borough of Brooklyn, to Grand street, Queens, estimated to cost $200,000. (May 18, p. 327.)

OTTAWA, OHIO.—Bids are asked, until Aug. 2, for a bridge 150 ft. long across Auglaize River. Louis N. Welde, Auditor, Putnam County.

PATERSON, N. J.—The county, according to report, is selling $104,000 bridge bonds. Geo. W. Bothyle, Clerk to the Board of Chosen Freeholders.

PHILADELPHIA, PA.—The City Comptroller received the following schedule of the apportionment of $2,800,000 of the $11,200,000 loan as follows: Bureau of Highways—Improvement of suburban roads, $150,000; repaving streets, etc., $350,000; repairs to paved streets, $5,000; grading streets, roads, etc., $25,000; general repairs to bridges, $25,000; curved curbing, $25,000; repairs to asphalt streets, etc., $25,000; resurfacing streets with sheet asphalt, $300,000. Bureau of Surveys—Abolishing grade crossings on line of Philadelphia & Trenton Railroad, $200,000; construction of bridges, $600,000. Bureau of Water—Extension, improvement and filtration of water supply, $1,000,000.

PRINCETON, IND.—The Toledo Bridge Co. has the contract for the 234 ft. steel bridge over Patoka River. It is of two spans, one a 154-ft. pin connected truss, and the other a 70-ft. deck girder.

ST. BERNARD, OHIO.—The Connecting Belt Line Co., according to report, will build a bridge over the Carthage pike, south of Bloody Run.

ST. JOSEPH, MICH.—The City Council, according to report, is considering a viaduct over the Pere Marquette tracks at a cost of $15,000.

SAN JOSE, CAL.—The County Surveyor is authorized to prepare plans and specifications for a combination bridge over the Guadalupe River at Hamlin street.

RICHMOND, IND.—Contracts have been let to the Massillon Bridge Co. for rebuilding some of the bridges and culverts in the vicinity of Richmond destroyed by high waters. (July 13, p. 486.)

ROMA, ONT.—The Town Council wants bids for a new bridge at Fawkham; also for a bridge across the Black River.

SCRANTON, MISS.—The Supervisors of Jackson County, according to report, will let a contract, Aug. 6, for a steel bridge over Red Creek.

SHARON, PA.—The Town Council of the Borough of Sharon is petitioned to build a bridge over the Shenango River near the place where the former bridge was located.

SOUTH BEND, IND.—Bids are wanted, Aug. 15, by the Board of County Commissioners for a plate girder bridge about 380 ft. long, estimated to cost $50,000, over the St. Joseph River at Sample street. John W. Brown, County Auditor, South Bend.

The Indiana, Illinois & Iowa R. R. Co., according to report, proposes a drawbridge over the St. Joseph River for an extension.

SPRINGFIELD, MASS.—Local reports state that Water street will be extended north under the Boston & Albany R. R., at which point a bridge will be required.

SPRINGFIELD, OHIO.—The Board of Public Affairs, according to report, will soon want bids for a steel bridge across Buck Creek.

Reports state that the Dayton, Springfield & Urbana Electric Ry. has decided to build a bridge over Buck Creek at North Fountain avenue. (June 15, p. 406.)

STOCKTON, CAL.—The Board of Supervisors of Tuolumne County has condemned the Moffitt bridge and authorized bridge plans and specifications made for a new structure.

STRATFORD, ONT.—The Town Council has decided to build the proposed steel bridge across Avon River at John street.

TERRE HAUTE, IND.—Reports state that the Evansville & Terre Haute R. R., and the Southern Indiana have agreed upon payment for the proposed viaduct across Ohio street, which is estimated to cost $50,000.

THREE RIVERS, QUE.—The American Bridge Co., of New York, has the contract for the steel bridge over the St. Maurice River. The bridge will be 1,400 ft. long and have 11 spans.

WABASH, IND.—Bids will be received, Aug. 13, for ten bridges. Address B. F. Clemens, Auditor, Wabash County. A bridge is proposed on Lafontaine avenue.

Other Structures.

AVOCA, PA.—The Erie & Wyoming Valley contemplates building a ten-stall roundhouse and car repair shop, also a new coaling station, at Avoca, in connection with establishment of new yards at that place.

BENWOOD, W. VA.—The Wheeling Steel & Iron Co. has begun work on a tube mill at a cost of about $500,000.

BERLIN, CONN.—The New York, New Haven & Hartford, according to report, has decided to build new stations at Plainville and Berlin.

BINGHAMTON, N. Y.—It is stated that bids will soon be wanted for the new Delaware, Lackawanna & Western depot. Plans and specifications are ready.

BOONE, IOWA.—Lightning struck the Chicago, Milwaukee & St. Paul depot at Boone, July 10, and the building was completely destroyed by fire. It will be replaced by a modern brick structure.

MCKEE'S ROCKS, PA.—The Pressed Steel Car Co., July 12, let the contract for the addition to be built to the McKee's Rocks plant to the Riter-Conley Mfg. Co. The addition will be used for building the new style box car with wood superstructure and steel underframing. The new plant will cost $100,000 and employ 700 additional hands. The building will be 200 x 350 ft.

NEWPORT, R. I.—A new station, according to local reports, is proposed by the New York, New Haven & Hartford at Newport.

PHILADELPHIA, PA.—Geo. W. Roydhouse & Co., of Philadelphia, and Wm. Miller & Sons, of Pittsburgh, are the general contractors for the new Union passenger station for the Pennsylvania R. R. in Pittsburgh. The Shiffler Bridge Co. will supply the steel framework; James May Co., of Allegheny, the plumbing and fitting; Morse, Williams & Co., of Philadelphia, the elevators. Several contracts are yet to be let.

PROVIDENCE, R. I.—The New York, New Haven & Hartford will make extensive improvements at the Wilkesbarre Pier at Providence, extending the old pier some 30 or 40 ft. to deep water and the installation of modern and complete machinery for discharging coal. Work will be begun as soon as the plans are prepared.

SAVANNAH, GA.—The Union Station Co., to be chartered as a railroad company, has been formed to build the union passenger station and terminal for the Southern Ry., the Plant System and the Seaboard Air Line, for which preliminary plans have been made by the Georgia Construction Co., of Savannah. The company will be capitalized at $300,000 and will build a brick and granite station. It will also build and control about eight miles of track. It is expected that work will be begun in six weeks. The building and shed will not cost more than $150,000. W. V. Davis is Secretary of the Construction Company.

ST. PAUL, MINN.—Fire in the Chicago Great Western's former shops at South Park, July 13, destroyed seven buildings. The shops were recently moved to Oelwein, Iowa, and the buildings were used as storehouses. The loss is estimated at $100,000.

SIOUX CITY, IOWA.—Reports state that a number of large grain elevators will be built along the Charles Mix County extension of the Chicago, Milwaukee & St. Paul. W. N. Day, Division Agent of the company, has supervision of the grain elevator sites.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xi.)

PERSONAL.

(For Other personal mention see Elections and Appointments.)

—Mr. Francis R. Torrington, a young engineer in the employ of the Isthmian Canal Commission, is dead.

—Mr. S. Goodman, Assistant Traffic Manager of the New York Central & Hudson River Railroad, and Miss Saidee Kellogg were married on July 7.

—The Georgia Railroad Commission met on July 7, and Mr. J. P. Brown, the new Commissioner, took up his duties. Col. T. C. Crenshaw, Jr., was elected Chairman of the Commission, succeeding the late Col. Trammel.

—Mr. Thomas Appleton, who recently resigned as Chief Engineer of the Copper Range Railroad, has been appointed Assistant Superintendent of Construction of the United States Life-Saving Station, Atlantic and lake coasts, with headquarters at New York.

—Mr. John H. Crawford is now General Eastern Freight Agent of the Delaware, Lackawanna & Western, at 429 Broadway, New York. Mr. Crawford was born in Burlington, Iowa, 38 years ago last December. He has been over 22 years in railroad service, 13 with the freight and soliciting departments of the Chicago, Burlington & Quincy at various places, and nine years with the Lackawanna Line. For a little over six years he was agent of the Lackawanna Line, with headquarters at St. Louis. On February 1, 1898, he was elected General Manager of that line, and resigned to accept his present position.

—Mr. Bernard Marion, as already noted, has been made Superintendent of the Birmingham, Selma & New Orleans at Selma, Ala. Mr. Marion was 47 years old on April 11 last. He entered the service of the Vicksburg & Meridian on May 10, 1870, as bridge and track laborer, and became section foreman, work train conductor, Assistant Roadmaster and Roadmaster. May 3, 1883, he became General Foreman of bridge and track laying for the Illinois Central from Jackson, Miss., to Yazoo. On December 20, the same year, he was made Roadmaster of the Louisville, New Orleans & Texas. Six years later, on April 15, he was appointed Superintendent of Bridges and Buildings of the Yazoo & Mississippi Valley, and continued in that office until January 1, 1897, when he was made Assistant Trainmaster and Road Superintendent of the Riverside Division of the same company. He held this position until July 1 of this year.

—Mr. A. J. Gowrie, who on June 7 was appointed Division Superintendent of the Port Arthur, Duluth & Western line of the Canadian Northern, with headquarters at Port Arthur, Ont., was born at Raith, Kirkaldy, Scotland, December 10, 1868. After being educated in the public schools, he began railroad work in the General Goods Manager's office of the Caledonian Railway at Glasgow, Scotland, in May, 1883, and served with various departments and at several stations of that company. Going to Canada in May, 1892, he was employed as clerk in the Superintendent's office of the Canadian Pacific at Fort William, Ont., until August, two years later, when he was promoted to Chief Clerk and Accountant. He held that position until October, 1899, when he entered service with his present company, the Canadian Northern, in charge of the Operating Department at Winnipeg, Man., under the General Superintendent. He continued in that position until his recent promotion.

—Mr. C. A. Preston was lately made Division Superintendent of the Northern Central at Elmira, N. Y. He was born in Philadelphia September 16, 1852. After being graduated from the Polytechnic College, Philadelphia, in 1872, he began practice as a civil engineer. He was engaged until June, 1877, as transit man and engineer in charge on railroad surveys in southern New York, New Jersey, eastern Pennsylvania and Maryland. Later Mr. Preston was with the Collins expedition to Brazil, and returned in 1879. He entered the service of the Pennsylvania Railroad in May of the same year, and in September, the following year, went to Baltimore, Md., as Assistant Supervisor of the Baltimore section of the Northern Central. In November, 1880, he went to Mexico as Principal Assistant Engineer with the Mexican National Construction Co., returning to the United States in April, 1882. He again entered the service of the Northern Central as Assistant Supervisor at York, Pa., and has been since that time in continuous service with the Pennsylvania.

—Mr. Cecil Gabbett, as already noted, was on July 1 made Superintendent of the Fourth Division of the Seaboard Air Line. Mr. Gabbett was born in Tipperary, Ireland, August 19, 1846. He was graduated as Bachelor of Engineering in the Queen's University of Ireland at Dublin in 1869. He entered railroad service in June the same year as Assistant Civil Engineer of the Midland Great Western of Ireland. Coming to this country in 1870, he was for a year Assistant Civil Engineer of the Vicksburg & Brunswick and the Atlantic & Gulf. In 1872 he was Assistant Engineer of the Southwestern Railroad of Georgia in charge of construction. For five years, until 1877, he was Civil Engineer in the service of the U. S. Engineer Corps. He then entered the service of the Western Railway of Alabama as Engineer and Roadmaster until September, 1878, and as President and General Manager to April 1, 1883, and until November 11, 1889, as General Manager of the Western of Alabama and the Atlanta & West Point. During part of the same periods he was Superintendent of the Atlanta & West Point, from July 25, 1881 to 1883; also First Vice-President and General Manager of the Atlanta & Florida, and General Manager of the Cincinnati, Selma & Mobile. From September, 1889, to June, 1891, he was General Manager of the Central Railroad & Banking Co. of Georgia. He served as General Manager of the Columbus Southern from April, 1892, to February, 1893, and from December 1, 1892, to August 15, 1895, as General Manager of the Savannah, Americus & Montgomery. Since that date, and until July 1 last, he was President and General Manager of the Georgia & Alabama, which was then absorbed into the Seaboard Air Line.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—E. McCann, heretofore General Foreman of Bridges and Buildings of the Gulf, Colorado & Santa Fe, has been appointed General Supervisor of Bridges and Buildings and Water Supply of the entire line.

Atlantic & North Carolina.—B. A. Newland has been appointed Master of Transportation.

Central of Georgia.—Edward Workman, Secretary, has resigned.

Chicago, Milwaukee & St. Paul.—G. H. Heafford, General Passenger Agent, with headquarters at Chicago, Ill., has resigned.

Cleveland, Lorain & Wheeling.—John F. Whitelaw has been elected as a director. C. E. Fisher has been appointed Auditor, succeeding W. H. Park, resigned.

Colorado & Southern.—W. N. Schoff, heretofore Purchasing Agent of the St. Paul & Duluth, has been appointed Purchasing Agent of the C. & S.

Fulton County Narrow Gauge.—At the annual meeting of the stockholders, held July 11, W. G. Sharretts was elected Vice-President and Assistant Treasurer, and J. A. Westblade, Secretary.

Grand Trunk.—T. Trenlean has been appointed Master Car Builder with headquarters at London, Ont., succeeding S. King, resigned.

Illinois Central.—A. J. McDougal has been appointed General Eastern Passenger Agent, with headquarters in New York.

Indiana, Illinois & Iowa.—F. M. Keys has been appointed Assistant Superintendent of Construction, with headquarters at Chicago, Ill.

International & Great Northern.—Frank J. Gould has been elected First Vice-President, and Leroy Trice, Second Vice-President.

Kansas City Southern.—Samuel W. Fordyce, President, has resigned, effective Aug. 1.

Lake Shore & Michigan Southern.—C. R. Emery has been appointed Superintendent of Dining Cars, succeeding W. H. Lindley, deceased.

Lehigh & Hudson River.—Frank T. Sayer has been appointed Assistant General Passenger Agent, with headquarters at Warwick, N. Y., effective July 16.

Los Angeles Terminal.—T. C. Peck, in addition to his duties as Assistant to the General Manager, has been appointed General Passenger Agent.

Minneapolis, St. Paul & Sault Ste. Marie.—W. C. Stone, Assistant Secretary and Treasurer, has resigned.

Moscow, Camden & San Augustine.—At a meeting of the stockholders, on June 28, the following officers were elected: President, W. T. Carter; Vice-President, C. H. Jones; Treasurer, E. Carter; and Secretary, Jack Thomas. (See R. R. Construction column, May 5, 1899, p. 324.)

Pennsylvania.—The following appointments have been announced for the recently acquired lines of the Western New York & Pennsylvania and the Allegheny Valley: R. Bell, Superintendent of the Buffalo and Rochester Division; C. T. Dabney, Superintendent of the Chautauqua Division, and C. B. Price, Superintendent of the River Division, effective Aug. 1. Several other changes have taken place, as follows: W. H. Myers has become General Superintendent of the Philadelphia & Erie R. R. Division, succeeding G. W. Creighton (p. 487.) Wilson Brown becomes Superintendent of the Middle Division and is succeeded as Superintendent of the Amboy Division of the United R. Rs. of New Jersey Division by F. P. Abercrombie, who, in turn, is succeeded by L. W. Allibone, as Superintendent of the Cambria & Clearfield Division. C. S. Long succeeds Mr. Allibone, as Superintendent of the Bedford Division.

Philadelphia & Reading.—Daniel H. Deeter has been appointed Master Mechanic, with headquarters at Philadelphia, Pa., succeeding H. Delaney, resigned. A. H. Yocum has been appointed Signal Engineer, and the position of General Signal Foreman is abolished, effective July 1.

Rochester & Lake Ontario.—The following new Directors have been elected: F. B. Mitchell, W. Purcell and A. Vogt.

St. Louis, Kansas City & Colorado.—L. M. Fouts, General Manager, having resigned to accept service with the Allegheny Improvement Company, the duties of the office have been assumed by Geo. L. Sands, Vice-President. H. L. Marvin has been appointed Chief Engineer, in direct charge of Maintenance of Way and Construction Departments, with headquarters at Union, Mo., effective July 1.

United Verde & Pacific.—Paul P. Hastings has been appointed Auditor and General Freight and Passenger Agent, with headquarters at Jerome, Ariz., succeeding R. H. G. Minty, resigned.

Western New York & Pennsylvania (Pennsylvania).—At a meeting of the stockholders, held July 13, W. H. Barnes, John P. Green, Samuel Rea and T. DeWitt Cuyler (all Directors of the Pennsylvania) were elected

Directors of the W. N. Y. & P., succeeding C. M. Lea, E. W. Clark, Jr., E. C. Miller and E. L. Owen, resigned.

Wheeling & Lake Erie (Coshocton & Southern).—Since July 1, the C. & S. is being operated as a part of the Cleveland Division and the jurisdiction of the general officers and officers of this Division of the W. & L. E. are extended over the same. All persons in the employ of the Receiver, will, until otherwise notified, continue in their present positions. (See Coshocton & Southern, R. R. News column, July 13, p. 488.)

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

Algoma Central.—Foley Bros., of St. Paul, Minn., have the contract for building 100 miles of this line from Sault Ste. Marie, Ont., north toward Dalton. F. H. Clerque, of Sault Ste. Marie is President. (April 27, p. 279.)

Arizona & New Mexico.—An officer writes that no surveys have been made for the proposed line from Lordsburg, N. Mex., east about 150 miles to El Paso, Tex. It is not known when, if ever, this extension will be built. (July 13, p. 487.)

Atchison, Topeka & Santa Fe.—Building is in progress on six miles of sidetrack for the San Francisco & San Joaquin Valley at the Point Richmond (Cal.) terminal.

Surveys are reported in progress for an extension of the branch from Cleveland to run east about 43 miles to Silsbee, on the Gulf, Beaumont & Kansas City. The branch now runs to Trinity River.

Atlantic Coast Line.—Bids are asked, until July 21, on three miles of track for reducing curves north of Emporia, Va. (July 13, p. 487.)

Bangor & Aroostook.—The State Railroad Commissioners have granted the petition of this company to locate a spur track from the main road to the mill of the Mattawamkeag Lumber Co., at Augusta, Me.

Burlington, Cedar Rapids & Northern.—Johnson Bros., of Cedar Rapids, Ia., have the contract for the extension from Albert Lea, Minn., north 38 miles to Faribault. The line will cross the Chicago & Northwestern at Owatonna, and the Chicago, Milwaukee & St. Paul at Medford. (July 13, p. 487.)

California Roads.—The Fountain Head Oil Co. has asked a franchise for spurs to its land near Bakersfield.

Calvert, Waco & Brazos Valley.—In addition to the extension from Calvert, Tex., north about 28 miles to Marlin, now building, it is proposed to extend the line further north about 84 miles into Fort Worth. Arrangements are reported completed for four miles of trackage from Manchester into Fort Worth, on the Texas & Pacific. Building will not be begun until fall.

Chicago, Rock Island & Pacific.—The company has accepted the proposition of the town of Mangum, Wheeler County, Okla. T., to extend its Mountain View line west about 50 miles to that city, and cross-sectioning was begun July 9. It is expected that track will be laid into Mangum some time in August. (Feb. 23, p. 127.)

Choctaw, Oklahoma & Gulf.—With reference to the extension from Hartshorne, Ind. T., southwest about 110 miles to Ardmore, an officer writes that he knows of no conclusion as to the building. (July 6, p. 472.)

Delaware, Lackawanna & Western.—Professor Geo. F. Swain, of Rochester, N. Y., has submitted a report to the Newark (N. J.) Board of Works with reference to the track elevations of the D., L. & W. in that city, and a joint conference with the railroad will be asked.

Erie & Wyoming Valley.—With reference to the new coal yard at Avoca, Pa., an officer writes that the contract for grading and masonry has been let to Lathrop & Shea, of New Haven, Conn. The yard is being built to provide sufficient track room for handling coal traffic and to allow more economical switching. The yard connects directly with the main line and is located opposite the branch to Pittston. The yard will have three switching tracks and eight yard tracks, the latter being 2,200 ft. long. The yard will be 4,800 ft. long and without a curve. The estimates provide for 300,000 cu. yds. of grading and 3,000 cu. yds. of masonry. There will be three overhead bridges, two over railroads and one over the city street. In connection with the yard, the company contemplates building a ten-stall roundhouse and local car repair shop. A new coaling station is likewise contemplated. (July 6, p. 472.)

Eureka & Klamath River.—Building is in progress on the extension from Eureka, Cal., to Arcata, nine miles. Nearly all the grading is completed and about one mile of track laid. The work is being done by the company. (June 22, p. 434.) One drawbridge is required. (Official.)

Great Eastern.—Building is to be begun soon at Fremont, N. C., on this proposed line from Selma east 137 miles, via Fremont and Snow Hill, to Douglas Bay on Pamlico Sound. (Feb. 10, 1898, p. 108.) J. W. Lynch, of Kinston, N. C., is President, and Geo. W. Sugg, Snow Hill, N. C., Secretary. (Official.)

Great Northern.—Plans are reported completed for a cut-off on the Montana Central, running from a point about 25 miles east of Great Falls, Mont., into the city of Great Falls. The new line will follow the bluffs along the river until within one mile of the Rainbow Falls, where it will turn and cross the river about 180 ft. above the Falls. Then, after making a loop, it will follow the river bank to the city.

Hilgard, Granite & Southwestern.—All the surveys are completed for this proposed line from Hilgard, Ore., on the Oregon Railroad & Navigation line, to run south 60 miles through Granite. W. T. Chalk, of Granite, is engineer in charge. (May 18, p. 329.)

Indianapolis, Morrisville & Rushville.—This company has been incorporated in Indiana to build an electric road from Indianapolis southeast about 40 miles via Irvington, Julietta, New Palestine, Reedville, Fountaintown, Morristown, Gwynneville and Arlington to Rushville, paralleling the Cincinnati, Hamilton & Dayton. John H. Mahoney is President; John Navin, Secretary, and Wm. Frazee, Treasurer. The principal office is Indianapolis.

Iowa City & Old Man's Creek.—This company is being organized in Iowa to build a railroad about 35 miles long from Iowa City west along Old Man's Creek valley, via Unity, Windham, Frendale and Holbrook to Williamsburg, running about midway between the Chicago, Rock Island & Pacific on the north, and the Burlington, Cedar Rapids & Northern on the south. No surveys are made as yet but a bonus has been raised by subscription. Very little grading will be required and practically no bridging except across the Iowa River, which will require a bridge about 200 ft. long. It is proposed to use electricity, making the road standard gage and adapted to short hauls for farmers, and carrying both freight and passengers. Among those interested are Dr. F. Kiser, Windham, Ia., and M. L. Ferson, Frendale. (Official.)

Kansas City, Liberty & Excelsior Springs.—This company, incorrectly entered last week (p. 488) as the Kansas City, Liberty & Eldon, was incorporated in Missouri, June 30, with a capital stock of $1,000,000, to build a railroad from a point in Clay County, opposite Kansas City, Mo., to run northeast about 30 miles via Liberty to Excelsior Springs. Among the incorporators are: Claude Hardwicke, Liberty, Mo.; Joseph S. Chick, Kansas City, Mo.; Chas. H. Koppinger, Excelsior Springs, Mo.; J. P. Bauserman, Leavenworth, Kan.

Maine Central.—The State Railroad Commissioners have granted the petition of this company for a branch track from the westerly siding in Waterville, Me., to the shop of H. C. Morse.

Missouri Pacific.—A large force is at work near Redfield, Ark., straightening the curves and filling in trestles between that point and Pine Bluff.

Oklahoma City Terminal.—The injunction asked for to prevent this company from building its line over certain lots in the west part of Oklahoma City, Okla. T., has been denied and building is to be begun at once. The company was incorporated last April to build about three miles of terminal line in that city. The St. Louis & San Francisco is interested. C. G. Jones, of Oklahoma City, is President. (May 4, p. 295.)

Pennsylvania.—Surveys are reported in progress for an extension from Northumberland, Pa., east about 35 miles via Danville and Bloomsburg to Berwick, along the north side of the river, paralleling the Delaware, Lackawanna & Western. The Pennsylvania already has a line on the other side of the river.

Building is in progress on the Waverly & Passaic branch, which is to form a new freight cut-off skirting Newark, N. J. The new line crosses the Passaic by a high bridge near Harrison.

Contracts are reported let for the extension from Vintondale, Pa., west about 15 miles to Black Lick on the Indiana branch. (April 27, p. 280.)

Pittsburgh, Johnstown, Ebensburgh & Eastern.—Work has been resumed on the extension from Ramey south into Altoona, Pa. (Oct. 27, 1899, p. 753.)

Seaford Marine.—This company was incorporated in Delaware, July 11, with a capital stock of $10,000, to build ships, railroads, wharves, etc. The incorporators are: W. F. Haines, J. Milligan, A. Coulbourn and A. S. Wooley, all of Seaford.

Southern Pacific.—With reference to the new Ogden & Lucin cut-off across Salt Lake, in Utah, Mr. C. P. Huntington is quoted in *The Chronicle* as saying that the line is to be completed in about a year. It will avoid the circuitous route and heavy grades of the existing line, and while quite expensive to build, a great saving in wear of rolling stock over the Promotory Mountain and the lessened expense of handling the business will much more than pay the interest on the cost of the change of line. The new company was organized to do this work because the line was so radically different from the old line, which was built under the acts of Congress 1862-1864, but the new line will, of course, be in the interest of the Southern Pacific, which owns substantially all the stock of the Central Pacific. The new line will be about 107 miles long, making a saving of about 39 miles. (July 13, p. 488.)

Grading is reported in progress on about three miles of second track from New Iberia, La., west to Segura.

Spartanburg & Clinton.—This company has been incorporated in South Carolina, with a capital stock of $250,000, to build a railroad from Clinton, on the Seaboard Air Line, north 35 miles to Spartanburg. The incorporators are: L. H. Wilson, M. C. Poole, Daniel Yarborough, W. B. Patton, M. P. Patton, E. T. Lawson and W. T. Bobo, Cross Anchor, Spartanburg County; M. S. Bailey, Clinton, Laurens County; and S. C. Finley, T. B. Thackston and John Gary Evans, of Spartanburg.

Toledo & East St. Louis.—This company was incorporated in Illinois, July 13, with a capital stock of $1,500,000, to build a railroad paralleling the Cleveland, Cincinnati, Chicago & St. Louis from a point on the boundary line between Illinois and Indiana, in Vermillion County, to run west across Illinois to East St. Louis. The principal office is Chicago. The incorporators and first Board of Directors are: Albert Rathbone, New York; Howard M. Carter, Evanston, Ill.; Will H. Clark, Arthur Dryenforth, and Sidney W. Worthy, Chicago.

Velasco Terminal.—With reference to the reported extension in progress along the beach below Velasco, Tex., an officer writes that there is no new building to report. The company is simply making a few repairs. (July 6, p. 472.)

Wabash.—On account of the cost of materials, the building of the extension from Toledo, Ohio, west 56 miles to Montpelier will not be done this year. (June 15, p. 408.)

West Side Belt.—Right of way is secured for an extension of about 15 miles into coal lands in Jefferson and Baldwin townships. This is the successor to the Little Sawmill Run R. R.

GENERAL RAILROAD NEWS.

Atlanta, Valdosta & Western.—In our issue of Feb. 9, 1900, p. 85, we told the experience of the A., V. & W. in gaining an entrance to the union passenger station of the Jacksonville Terminal Company, at Jacksonville, Fla. The State Railroad Commission not only decided that the A., V. & W. should be permitted to use the tracks and station of the Terminal Company, but required the road to connect its tracks and run its trains into the station. The Terminal Company objected, which objection was upheld by the Circuit Court; but the Supreme Court reversed the decision. It is now announced that the A., V. & W. has acquired a one-quarter interest in the entire property, including tracks and depot, of the Terminal Company. Other owners are the Florida East Coast, the Seaboard Air Line and the Plant System. The A., V. & W. is represented in the Terminal Company by E. H. Barnes, the General Superintendent.

Bangor & Portland.—The Delaware, Lackawanna & Western is reported to have obtained control of this property which extends from Portland, Pa., to Nazareth, 27.97 miles, with a branch from Nazareth Junction to Martins Creek, 4.54 miles. The company also leases the Easton & Northern, from Belfast to Easton, 8.14 miles.

Boston & Albany.—The bill to lease this property to the New York Central has passed both Houses and was signed by Governor Crane on Tuesday. (June 29, p. 458.)

California & Nevada.—Operation of this property was to be resumed July 15 under charge of the Receiver, A. A. Grant. The road went into the hands of the receiver in May, 1896. (Jan. 26, p. 64.)

Central Massachusetts.—The Massachusetts Legislature has passed the bill authorizing the purchase of this property by the Boston & Maine, which now leases the road. Stockholders on July 18 voted to sell their shares to the B. & M. (June 15, p. 408.)

Chicago, Greenville & Southern.—This property is to be sold for taxes, at Greenville, Ill., on Aug. 1. It runs from Durley to Greenville, 3.4 miles, and is operated by the Jacksonville & St. Louis.

Chicago, Indianapolis & Louisville.—Judge Woods, in the United States Circuit Court, at Indianapolis, on July 7, handed down a decision in the case of the Louisville Trust Co., sustaining the finding of Special Master Winters that there was no fraud in the foreclosure proceedings of the old Louisville, New Albany & Chicago, and that the successor company is not responsible for the payment of the bonds of the Richmond, Nicholasville, Irvine & Beattyville. An appeal will probably be made to the U. S. Supreme Court. (April 13, p. 246.)

Cleveland, Akron & Columbus (Pennsylvania Co.)—The directors at Cleveland, Ohio, July 13, voted to issue bonds for $4,000,000 for improvements.

Detroit & Lima Northern.—The U. S. Circuit Court of Appeals has affirmed the decision of the Circuit Court at Toledo, Ohio, providing for the separation of the Columbus Northwestern from the Northern Division, and for the sale of the C. N. W., the upset price being $200,000. (July 6, p. 472.)

Grand Trunk.—The directors, until July 21, are prepared to exchange 4 per cent. consolidated debenture stock in exchange for terminable bonds on each £100 principal as follows: Equipment Mortgage No. 2, 6 per cent., £121; Midland of Canada (Sectional) 5 per cent. first mortgage, £100; M. of C. (Consol.) 5 per cent. first mortgage, £100; Northern of Canada 5 per cent. first mortgage, £96; N. of C. 6 per cent. third preference, £120; Montreal & Champlain Junction 5 per cent. first mortgage, £96; Grand Trunk Georgian Bay & Lake Erie 5 per cent. first mortgage, £97; Wellington, Grey & Bruce, £100; Michigan Air Line 5 per cent. first mortgage, £96; Grand Trunk Junction 5 per cent. first mortgage, 1901, £96; G. T. J., 5 per cent. first mortgage, 1934, £105. On each $500 principal Detroit, Grand Haven & Milwaukee 6 per cent. equipment mortgage, £103; D., G. H. & M. 6 per cent. consolidated mortgage, £101. The debenture stock is to be registered free of expense. Interest is payable quarterly on the 14th day of January, April, July and October. Additional amounts of debenture stock required by bondholders to enable them to register even amounts will be allotted at 107 per cent.

Indiana, Illinois & Iowa.—The New York Stock Exchange has listed an additional $500,000 first mortgage 5 per cent. refunding gold mortgage bonds, which is the balance of the $3,000,000 bonds authorized by the mortgage. These bonds are issued to pay for the Streator & Clinton extension from Streator, Ill., west 38.5 miles, which connects the road with the Chicago, Burlington & Quincy and the Chicago & Northwestern. (June 29, p. 458.)

Louisville, Evansville & St. Louis.—J. P. Morgan & Co., New York, are reported to have bought between $1,800,000 and $1,900,000 of the $2,400,000 of the 4 per cent. general mortgage bonds from the committee which represents the same. The time for further deposits without penalty is extended to August 15. (June 29, p. 458.)

Mattoon & Evansville.—This company was incorporated in Illinois, July 10, with a capital stock of $50,000, to operate that section of the Peoria, Decatur & Evansville from the Indiana line northeast to Mattoon. The incorporators and first Board of Directors are: John C. Welling, J. T. Harahan, William G. Bruen, Thomas E. King, Clarence W. Moore, all of Chicago, and connected with the Illinois Central.

Midland Terminal.—The Farmers' Loan & Trust Co., New York, as trustee, asks sealed proposals up to noon, July 25, for the sale of a sufficient number of bonds to invest $18,312.95 of the sinking fund. (Jan. 19, p. 48.)

Missouri Pacific.—The stockholders at St. Louis, on July 16, approved the issue of $15,000,000 5 per cent. debenture gold bonds, and $15,000,000 new stock. (May 18, p. 330.)

New York & Ottawa.—Judge Lacombe, in the U. S. Circuit Court, has authorized Henry W. Gays, receiver, to issue $585,000 receiver's certificates. (July 13, p. 488.)

Northern Pennsylvania Terminal.—Twenty-one first mortgage bonds have been drawn for payment by the Farmers' Loan & Trust Co., New York, at 110 and accrued interest on Aug. 10, at which date interest will cease. (Feb. 2, p. 80.)

South Shore.—Russell Sage, of New York, and H. H. McLean, of St. John, N. B., were, on July 13, appointed receivers of this line at the instance of the Metropolitan Trust Co., New York. The line runs from St. John, N. B., to St. Stephen, 82.5 miles, and is successor to the Grand Southern, chartered in 1872. The management needs $100,000 for operating the line, and Mr. Sage, who holds two-thirds of the bonds, is said to be willing to advance the money. The property is to be foreclosed.

St. Paul & Duluth.—The Northern Pacific has brought in a defense before the Minnesota State Railroad Commission with reference to the taking over of the St. P. & D. The claim is made that the St. P. & D. does not parallel the N. P. The distance between St. Paul and Duluth by the St. P. & D. is but 152 miles, against 257 miles by the N. P. tracks, a saving of 105 miles. (July 6, p. 472.)

Western New York & Pennsylvania.—The Board of Directors at Philadelphia, Pa., on July 13, ratified the leasing of the property to the Pennsylvania, to take effect Aug. 1.